THIS MONTH'S COVER

Typical of the early successful pharmaceutical aerosols is Lederle's "Rhulispray," a spray-on medication for poison ivy and other skin irritations. This and other types of pharmaceutical applications were discussed at the Aerosol Symposium for the Pharmaceutical Industry.

SEPTEMBER 1957 VOL. 2, No. 9

AEROSOL AGE

The magazine of pressure packaging

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BRICKBATS and BOUQUETS from the MAILBAG

To the Editor:

Please allow us to congratulate you on the wonderful work you are doing. We must say that we have been helped tremendously by your magazine, your articles on aerosols are studied carefully by the writer and his staff and many ideas on new ways of filling are the result of our studies.

One problem that is vexing us is a coating for tin cans. This is a problem we are trying to solve with the use of epoxy resins, but would like to know more about it.

Alberto Trilles
AEROSOL ARGENTINA SRL
Buenos Aires, Argentina

Our readers in the can making field are invited to contact Senor Trilles at Corrientes 484, Buenos Aires, to send him their views on coating of tin cans.

•

To the Editor:

In your July issue we read the interesting news about the contract loading station in Holland. We also can tell quite a bit about the development of the aerosol industry here, though we would say that the Dutch are not quite as aerosol-minded as the article would seem to indicate. However, we are confident that there will be a good market here in the very near future.

N.V. CHEMISCHE INDUSTRIE VETIRA
Zaandam, The Netherlands

•

To the Editor:

In the April issue of your magazine you mention a new insect repellent; "Diethyl toluamide". We are very interested in this product, but do not know who manufactures it. We should consider it a great favor if you would be good enough to send us the manufacturer's address; or better still, ask him to send us some samples direct.

L. FABN
DR. CARL HAHN KG.
Dusseldorf, Germany

We have advised the writer that diethyl toluamide is manufactured by Hercules Powder Co., and by Montrose Chemical Co. (for whom R. W. Greeff of New York is sales agent).

•

To the Editor:

We believe that it will be of interest to your readers to know we are about to launch the first wholly Argentine made aerosol in

(*Continued on Page 72*)

● **Entering The Aerosol Field** . . . Robert A. Foresman, a leading aerosol consultant, explains most of the basic whys, hows, and wherefores of entering the aerosol field for the "beginner." Lead article from Pharmaceutical Symposium appears on page 14.

● **Possible Aerosol Pharmaceutical Applications** . . . Dr. Martin Barr, associate professor of pharmacy at the Philadelphia College, presents a broad picture of possible future and present uses of aerosols in pharmaceutical products. Article begins on page 19.

● **Aerosol Containers** . . . An outline of the history and current picture in the container field is the subject of W. Earl Graham's paper, beginning on page 25.

● **Aerosol Valves** . . . Actuators, metering devices, and other specialized valves for the pharmaceutical industry are discussed in detail by Walter Beard in an illustrated article on page 33.

● **The Aerosol Market** . . . Lessons learned over ten years of aerosol experience are summed up by Thomas D. Johnson, beginning on page 40.

● **Aerosol Propellant Systems** . . . The propellant, often judged the most crucial factor in pharmaceutical formulation, is discussed fully by David S. Tillotson in detail on page 44. Physical and chemical properties of various propellant mixtures are given, and advice as to possible formulation difficulties.

● **Aerosols In Review** . . . In keeping with the theme of this special issue, a number of U.S. and foreign pharmaceutical applications are summarized. Also, a capsule picture of behind-the-Iron Curtain aerosol activities.

EDITORIALS

Growing-up in Advertising

Though it has long been our practice to lament the poor advertising effort made by aerosol marketers to present their products to the public as "something special", there has, of late, been a marked improvement. Pick up a consumer magazine of the caliber of (for instance) *Lady's Home Journal*, and look through it for advertisements featuring aerosol products. The results will be gratifying, for most issues of leading women's magazines contain anywhere from five to 12 pages advertising aerosol products.

These advertisements, many of them in full color, are in the best "class" or "luxury" advertising tradition. They rank in eye-appeal with any other fine advertisements in the magazine; and (what is possibly more important) many of them make prominent mention of such terms as "aerosol", "push-button", "spray", "pressurized", and others that denote the distinctiveness of the aerosol package.

Whether or not this growing realization of the inherent selling power of the aerosol package represents an improvement, or something that has been brewing a long time (though with considerably smaller advertising budgets) doesn't really matter. What *does* is that this trend will help greatly in gaining millions of new adherents of all types of aerosol products—advertised or not. The woman who can be persuaded to bring a hair spray product into her home, will, when she next buys, inevitably begin to look for other products in spray cans; and the cumulative effect will be to give the aerosol industry a shot in the arm each time a "first purchase" is made.

During the first eight months of this year we have also noticed a maturing on the part of industry concerning the appeals of "luxury" packaging. Considerably more effort, time, and money is being put into label, container, and cap design—and shoddiness of packaging is becoming more and more a thing of the not-too-dim past. Sharpened competition among individual product types (particularly hair sprays and shave creams) has forced the leading marketer to make an effort to have *his* container the most distinctive, beautifully designed, or colorfully-labelled container on the market. Also, it has stepped up research to effect new refinements in formulations, valves, and the other components of the package to give it added distinction and buyer appeal.

This is a healthy situation, and can bring only benefits to the industry. Competition of this type, if carried to all other aerosol product types, will have the sum effect of removing any stigma of "amateurism" from our new industry, will force everyone to look to the appeal of his own package, and will eliminate those aerosols that are crudely labeled or sloppily packaged. Competition is the great leveler of mediocrity, and the aerosol industry can well use sharpened competition in a number of product types.

As a few notable examples, we might point to insecticide, paints, shoe polish, and industrial type products such as mold releases, belt dressings, etc., all of which show the effects of lack of competition. Too often these products are packaged in containers with little or no special appeal, and "exclusive" or "semi-exclusive" marketing arrangements have in some cases so hindered competition that the container looks much like it did when first introduced seven or eight years ago. Every old-time marketer would do well to reexamine his products in the light of improved concepts developed by his contemporaries—and the hair spray and shave cream product lines would seem to be logical starting places.

In brief, there's no such thing as "paying too much attention" to package design.

Entering the Aerosol

WHEN I was asked to cover the subject of "How To Enter The Aerosol Field" in this symposium, my immediate reaction was to advise my listeners to retain a competent consultant, scoop all the problems into his hands, and sit back and relax. However, a little reflection indicates that this part of the program might appear both biased and inadequate with such an approach.

The problem of entering the aerosol field for this group is, in reality, the problem of preparing to enter the aerosol market. Once a proved finished product is at hand, the pharmaceutical industry is well prepared by experience to develop sales in the market place. The factors involved in development and production of the finished product must be known and evaluated before a decision for or against entry into the field can be made.

In order to talk intelligently about entry in a field such as aerosols, we should know generally:

1. Make-up of at least a typical end product.
2. Factors going into the development of the end product.
3. The various approaches to end product development.
4. Various approaches to commercial production of the end product—including:
   - Economic aspects
   - Policy aspects
5. Collateral specialized considerations concerning the industry.

We have discussed aerosol packages and we have heard of the various details that go to make up an aerosol package. For the sake of clarity it may be well to describe a couple of complete typical aerosols before we continue.

A typical metal aerosol could be described as follows:

> Metal container from 3 oz. through 17.6 fluid oz. capacity.
>
> Contents: non-poisonous, and if flammable have a flash point of 20°F. or above.
>
> Internal pressure must not exceed 75 psi absolute at 70°F. and contents must not completely fill the container at 130°F.
>
> Container must have passed test (usually underwater) with contents at 130°F. without evidence of leakage, distortion, or other defect.

A typical glass aerosol could be described as follows:

> All glass or plastic covered glass container—capacity of four ounces or less.
>
> Internal pressure generally below 40 psi absolute at 70°F.

Formula-wise we can say that the contents of either of these containers could consist of:

Pharmaceutical Concentrate 50%
Propellant (Liquefied Gas) 50%

The pharmaceutical concentrate would consist of active ingredients carried in oil, alcohol, water, or other base.

The propellant could be a halogenated hydrocarbon, a pure hydrocarbon, or a mixture of both.

THE foregoing descriptions are not at all comprehensive, but they can serve to focus our thoughts on the general limitations of the aerosol packages. We will read in detail the valve, propellant, and container aspects of the aerosol package and will be able to see that, despite its ramifications, an aerosol package is simply a container filled with a certain amount of active material to which has been added some pressurizing factor, and arranged to dispense the active material in a desired form. Consideration of the methods of adding the pressurizing factor and the ramifications of its addition are, in reality, the reason for this symposium.

Once we know what specifications our packages must meet, a formula utilizing appropriate active ingredients and the propellant must be developed in the light of desired dispensing characteristics. This may be a simple matter of putting concentrate and propellant together or it may mean a long term formulation effort involving solvents, co-solvents, emulsifiers, anti-settling agents, or stabilizers, buffers, etc.

Obviously the pharmacology of the aerosol product must be considered in the light of experience as development proceeds, but it will be essentially meaningless to conduct pharmacological evaluations on other than a range-finding basis, until the concentrate has reached its final stage of perfection. Although changes in propellants or their proportions would not ordinarily be expected to make a whole lot of difference, gross

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* Presented at "The Aerosol Symposium For The Pharmaceutical Industry," August 20, 1957, Philadelphia College of Pharmacy and Science.

Field*

by Robert A. Foresman, Jr.
Aerosol Consultant
Philadelphia, Pa.

changes in propellant proportions may require changes in content of various ingredients (such as emulsifiers) and can also alter the actual dosage where meter valves are to be used. Essentially only a completely developed product lends itself to efficient pharmacological study.

When a product is to be considered for commercial pressure packaging, one of the earliest decisions should be the size of the package. This does not mean that the ultimate consumer size must be decided first, but classification into more or less than four ounces is highly desirable (since this is a practical size separation between metal and glass containers) and not because larger bottles and smaller cans are not in use. If glass containers can be used, and the economics of their use are acceptable, the evaluation of the product in metal can be de-emphasized, to say the least.

In most pharmaceutical developments, aside from the mechanical and economic details of packaging, the packaging process and the package components do not have to be a factor in the calculations of the development team. This is certainly not true of aerosol development. If metal packages are indicated, they introduce a variable in themselves which, while not completely unknown to the pharmaceutical industry, is nevertheless not a common one.

After a finished formula is put together, the stability of the compounded formula, in itself, under packaged conditions must be determined. This involves the time reactions between ingredients as well as the reactions between the contents and the package itself, including all components such as valves, gasketing materials, etc.

Room temperature storage packs must be made and held for adequate periods of time, and parallel accelerated storage tests can be helpful. For all storage testing it is well to recognize the need for adequate numbers of packages. It takes 333 packages to reveal failure at the level of .3%, yet when the merchandise is on a dealers shelf this .3% failure may very well become 7.2% loss, due to spoilage of an entire carton by one leaking container.

In the early days of aerosols, the industry relied rather heavily on 130° elevated temperature storage for a projection of shelf life. As time passed, however, it was noted that extrapolation of storage from 130° data was not always possible. In some cases reactions occurred at the higher temperature which never occur normally, and in other cases effects were totally masked at 130° which occurred very rapidly at room temperature. For this reason we have come to rely more on 100° storage than on 130° even though we still run both tests. Ordinarily we can consider the results of a chemical reaction occurring at 100° in one month to be the equivalent of from four to nine months at 70°. This interpretation must never be rigidly applied in complex systems such as aerosols, but it does help in making an educated guess.

BEFORE I go into the pros and cons of various developmental approaches, I want to inject a slightly foreign note. Frequently a very early approach to the investigation of aerosols is to acquire a tank or two of propellant and play around with it to get the feel of it. This is constructive and generally it is a good idea, but a precaution or two is in order. Fire or heated metal and propellants do not mix. The halocarbons are for the most part flame depressants, but they have the unhappy characteristic of forming phosgene in contact with flame or glowing metal, and since laboratories may have both in quantity, it is a good idea to give careful thought to vapor flow patterns from point of use to flames and hot grids. Localized concentrations of phosgene can occur around burners, hot plates, etc. without any particular indication of the seriousness of the exposure to the laboratory personnel. This is especially true of low concentrations over a period of time.

Butane and propane can of course explode violently when ignited, and both are inclined to be sneaky in that they flow in the vapor state to low points and tend to accumulate in pits, drain sluices, access ways, stair wells, etc. They should always be used with the utmost circumspection.

The test techniques for aerosols include many standard laboratory procedures. Certainly a major one for your industry would be the check on potency maintenance against time. Collaterally with that would be the analysis for toxic or undesirable decomposition products (if any) in-

cident to potency drop or other chemical change. In addition to these and similar standard tests, however, there are procedures unique to aerosols. Among them are determination of:

Reaction between propellant and active ingredients.
Pressure temperature relationships.
Particle size range against temperature pressure limits normally expected.
Density of contents as finally packaged.
Flammability and flash point.
Free halogens or break-down products incident to hydrolysis of propellants.
Contamination of products with corrosion by-products or leached fractions from elastomers, plastics, etc.
Specific heats — if cold fill is a factor.
Spray pattern.
Physiological dangers of vagrant mists (this is included here since it is specific for aerosol products even though it is a pharmacology problem).
Acceptable water level for optimum storage stability of finished packages.
Discharge rate for non-metered valves.
Deposition efficiency for surface sprays.

Instrumentation for various types of determinations and tests may be specialized in some instances, while normal laboratory procedures employing spectrophotometry gas chromatography, Karl Fischer Titrations, etc. may be used for others. Standard methods for a number of the tests have been developed by various subcommittees of the Chemical Specialties Manufacturers Association.

Our problem being more or less defined, there remains the question of how to solve it. Traditionally, the pharmaceutical industry has been inclined to solve its own problems under its own roof, so to speak, and it may be that when all factors are considered, that same approach to aerosols can be satisfactory. However, there are actually five possible approaches to the developmental phase of an aerosol product, namely:

1. Grants to Educational Institutions — at this time this would constitute expansion of education in aerosols at the college level. Ultimately this would be one of the most effective methods possible for the development of new products. No elaboration of this approach is necessary for this group.
2. Use of suppliers services.
3. Cooperative use of contract fillers facilities, personnel and know-how.
4. Use of consultants specialized in the field.
5. Establishment of your own laboratory and the training or acquiring of personnel to use it.

2. Supplier Services

Preliminary use of customer service experimental packaging of aerosols is an approach which can be helpful but which, by its nature, must be somewhat limited. Suppliers of containers, propellants, and valves, since the very beginning of aerosols, have made available experimental packaging and evaluation of final products to a very generous degree. Recently, suppliers of other classes of ingredients such as flavor materials, emulsifiers, waxes, lanolins, etc., have entered the field of customer service in aerosols.

Frequently, a few packages of your material put up as a service by one of the supplier companies will enable you to take a look at your projected product and reach an intelligent decision concerning your future in the field in less time and with less expense than would otherwise be the case.

One danger here, though, is the necessarily limited effort which can be devoted to any one product and the more or less required use of concentrates as supplied without major alterations. If your product works when packaged experimentally by a supplier, it is a good bet that technically it has possibilities. However, the fact that it may not work does not necessarily mean it cannot — frequently simple reformulation of the concentrate will do the job, or if not simple reformulation — real effort applied to the formula may very well turn out a superior product.

3. Contract Fillers Facilities

There are in the United States somewhere in the vicinity of one hundred contract loaders of aerosols. Many of these companies have excellent laboratory facilities and know-how. Frequently a very satisfactory working arrangement between a would-be customer and a would-be contract filler is possible and desirable.

If a decision can be made early in the game to use a contract filler for commercial production, it opens wide the door to all his specialized laboratory facilities and the trained personnel on his staff. While there may be some disadvantages, this cooperative approach involves minimum outlay of money and almost immediate attack on the problems by personnel completely conversant with what is required from an aerosol standpoint.

4. Use of Consultants

The retention of consultants specializing in various fields is a time honored practice in the pharmaceutical industry, and it can be effective in the field of aerosols. There are several new firms limiting themselves to consulting in aerosols, and a number of our old line consulting firms, such as Arthur D. Little and Battelle Memorial Institute, have become interested and competent.

Several arrangements utilizing consultants are possible:

1. Utilizing his facilities, know-how and personnel for a complete off-premises development program.
2. Utilizing his knowledge for advice on the establishment of facilities and training of personnel. Parallel to this he might be charged with development of initial products.
3. A cooperative effort between your own pharmacist and pharmacologists and your consultant.

4. Utilizing his ability only for the purpose of establishing your own facilities and know-how.

One precaution may be in order:— if maximum value is to be derived from your consulting expenditures, it behooves you to use one of the groups already familiar with the field, rather than to underwrite the education of a group new to the field.

5. Establishment of Your Own Laboratory

The establishment of an aerosol laboratory "under your own roof" is in the long run the most desirable way of handling aerosol research and development.

As laboratory facilities go, the expense is not excessive — $3,000 to $4,000 will outfit a laboratory with strictly aerosol equipment that could handle any and every problem in the field. This, of course, does not include benches, lights, non-aerosol instrumentation or the like.

The major expense and disadvantage of "doing it yourself" lies in the time lag and expense incident to personnel becoming technically proficient and knowledgeable industry-wise. The aforementioned use of a consultant advisor can of course mitigate this to some extent.

While each of the methods possible for the development of an aerosol product or line of products has been outlined separately, it is possible that all of them may, in the course of time, be used in varying combinations.

ONCE the end product development is completed, the commercial production of units must be accomplished. The decision as to how best to handle this phase must rest on a number of factors, which can be broken down into two main headings: —

1. *Policy* — which may determine the decision without any further discussion since there are companies which either do not produce anything under their own roof or, fortunately more numerously in this industry, will not sell anything not produced under their own roof.
2. *Economic* — for the large mass of concerns, any part of the decision concerning production of a new product must be based on dollars and cents and it is this aspect with which we must concern ourselves here.

The first consideration in deciding what the most advantageous course will be for producing aerosols must be the output level required. There are two general levels of production where the economics of the situation call for the ultimate establishment of your own facilities. The first is when comparatively low production is projected and the second is when production in multiple millions per year is projected. The actual numerical breakpoint for either category is difficult to arrive at, but one thousand a day or less of a small fill item would certainly be on the low side and three million or more per year of a large fill item would at least approach the upper breakpoint, although some companies feel it is not economical until ten millions or more units per year are in the picture.

Except for the very small production levels, my advice is almost invariably to use the services of a contract filler, until the marketing and production headaches have been eliminated and a decision whether or not to continue with the contractor can be made on the basis of concrete information.

The contract filler offers many advantages to his customers. He can and will stock everything that goes to make up a package. He will usually warehouse and drop ship your inventory and will maintain inventory control for you independent of your own records so that you have that much less chance of an inventory (or lack of it) suprise at any stage of production. He will supply components not identifiably yours, from his stock (naturally he will not carry your stock of lithographed containers or overcaps on his own books over a period of time), he will absorb all manufacturing losses occurring in the course of your production not caused by your components, or otherwise your fault. His is the worry of procurement for the most part, the maintenance of equipment, physical handling of your stock and if trouble occurs with some component, fighting your battle with the manufacturer.

PURCHASING economies by the filler at all stages, and which can be passed on, are possible because of his large consumption of each item involved. Help with design of packages and other details of planning, highly efficient because of experience, are available from the competent filler and frequently his knowledge can almost eliminate the need for some planning detail.

A very major advantage of using a contract filler lies in the fact that each package has a direct, specific and unquestioned cost, which from an accounting standpoint has much to recommend it. This cost will vary with the type of package as well as the formula. Very small or odd shaped bottles, or a hard-to-clean-up formula such as paint, may cost up to ten cents each, just for the filling service. On the other hand, standard type products run in large volume may be filled for as low as a three cents service charge.

In the pharmaceutical industry there is a good chance that a policy of "under our own roof" and economics can blend in the early stages of new production. Facilities little more elaborate than those the Philadelphia College has in its laboratory can produce probably a thousand two ounce units per day with perhaps three people working at the job. Using this concept, a development laboratory can be established and its facilities then used with moderate efficiency to produce in great enough quantity to allow a decision to be made concerning further production.

The establishment of full production aerosol facilities will cost from approximately $30,000.00 up to $300,000.00 or $400,000.00. A certain amount of equipment is available for less than $30,000.00, but by the time all of the collateral facilities are in place it is pretty difficult to drop below this figure. At practically all price levels, equipment may be either of the cold fill or pressure fill type.

Except for pure economics of the particular installation involved, there is little to choose between the types as long as they will demonstrably do the same job. I am inclined to favor pressure fill in the abstract, but have frequently recommended cold fill where it has been indicated. Production rates will vary between 15 and 200 units per minute for the strictly production equipment, with the capital expenditure varying generally in direct proportion to capacity, although excessive automation or other refinement may alter this on occasion.

Personnel utilization must be taken into consideration in any decision in the matter of production facilities, and it is in this area where an exception to my unequivocal recommendation of contract filling may develop. Not infrequently, personnel are available from other operations in a plant for part time operation of a middle volume aerosol facility. Where this is possible, the advantages to be gained by efficient use of personnel, and the consequent avoidance of either "made work" or "layoffs," are usually so great that there can be no question as to the decision. Where this condition exists, the only choice to be made is what level of production is required to do the job with the time and personnel available — assuming of course, capital expenditure is not hampered too much by budgetary considerations.

SPACE requirements for an aerosol production unit in itself are not particularly large — 1,000 square feet being ample for moderate production type units. However, storage of containers, valves, cartons, labels, caps, propellants, and finished stock account for proportionately large areas which (coupled with clearance and access areas) necessitate careful planning if an efficient and adequate operation is to result. Obviously, there are no general rules concerning this aspect of your planning.

A very present danger, and one which has already overtaken a few companies, is the installation of high-capacity automatic equipment, and the employment and training of personnel necessary to run it, without considering what percentage of the work year would be taken up with normal, or even projected growth,

One successful pharmaceutical aerosol in Europe is "Polybactrin," an antibiotic powder spray

production. The result of such ill-advised installations, in some instances, is the entrance into unplanned fields with unintegrated products, or even contract packaging, by companies who originally intended only to produce their own carefully planned products. An over emphasis of the bugaboo of idle equipment may enter into some of the decisions concerning the use of extra capacity in these instances, but unfortunately labor costs go on and production space costs and capital expenditure amortization are usually considered to go on twenty-four hours a day. If equipment is idle it may be considered, from an accounting standpoint, that it is not paying its way. This can be an especial nightmare if financial statements are prepared on a quarterly basis and a year's production takes up only one or two quarters.

UNDER the last sub-heading in this presentation — a catch-all which I have termed "Collateral Specialized Considerations Covering The Industry," can be mentioned very briefly:

1. ICC Regulations — pertinent regulations apply directly to your actual production operations.
2. U. S. Department of Agriculture —
   (a) Aerosol Insecticides must be licensed.
   (b) Label approval and registration for all products coming under the Federal Insecticide, Fungicide and Rodenticide Act. Includes insect repellent, so called air sanitizers, and weed killer or other plant poisons.
3. U. S. Department of Health, Education and Welfare — Food and Drug Administration.
   This needs no elaboration with this audience except to say that it is best to plan that an old drug or curative agent dispensed as an aerosol will be construed as a new drug within the meaning of the act.
4. Patents — Certain broad scope patents such as the "Rise" foam patent must be considered.
5. Insurance — It is highly desirable to have specialized product liability insurance covering aerosol products, either through a rider on your existing policies or a new policy. In either case, aerosol packaging by generic name and description should be mentioned in the body of the policy.
   Another aspect of insurance is coverage for your property while on a loader's premises. If you supply concentrate and components or have a warehouse inventory and the loader's plant burns down, is your property protected either by his policy or yours?
6. Industry Association — There is none as such — However, practically all of the aerosol activity in the United States is focused in the Chemical Specialties Manufacturers Association, which is thereby in a position to be of tremendous help to anyone interested.

It has been my aim in this paper to provide general information concerning our industry, and the various considerations leading to your active participation in it.★

Possible Pharmaceutical Applications for Aerosols*

* Presented before 'The Aerosol Symposium For The Pharmaceutical Industry," August 20, 1957, Philadelphia College of Pharmacy & Science.

by Martin Barr, Ph.D
Associate Professor of Pharmacy
Philadelphia College of
Pharmacy & Science

INVESTIGATORS in the research and development laboratories of the pharmaceutical industry constantly seek newer dosage forms that will increase the therapeutic effectiveness of medicinals or increase the convenience of use by the patient. The successful development of such dosage forms usually results in not only increased sales, but often adds much prestige to the company in the eyes of other members of the health team, as well as in the eyes of the public. Such progress is indicative of good pharmaceutical research.

In recent years, we have witnessed the introduction and phenomenal growth of aerosols. Originally fostered by the old "bug-bomb" of World War II, the aerosol industry, now eleven years old, has passed the billionth package mark, and is aiming at that figure as an annual production rate within five years. The major applications of aerosol systems have been in personal products, including cosmetics and hair sprays, household products including deodorants, foods, insecticides, paints and various types of coatings. Until recently, very few pharmaceuticals were being utilized as aerosol dosage forms. Although the number has increased considerably in the past years, the use of aerosols as a pharmaceutical dosage form has yet to reach its potential. As it has been said by several individuals in the aerosol field, "pharmaceutical developers have a bull by the tail and do not know exactly what to do with it."

It is significant to note that a consumer publicity campaign to promote aerosol products has been launched by the Aerosol Division of the Chemical Specialties Manufacturers Association. The long-range objective of this program is to increase the sale of aerosol products. To accomplish this, the campaign will attempt to educate consumers in the convenience, economy and safety of aerosols; give the latest information on aerosols; encourage distributors to investigate and convert to aerosol packaging and explore new markets for aerosols. The association plans to place information on aerosols in newspapers, magazines, on radio and on television. The pharmaceutical industry should be aware of this program and take advantage of it.

Aerosols in Therapeutics

An aerosol is defined technically as a suspension of fine solid or liquid particles in air or gas. Through usage, the term "aerosol" today includes all those products that are dispensed from a container by a compressed liquefied gas, even though no suspension of particles in air may be involved, (i.e.; shaving lather).

Aerosol therapy, in the classical sense, is not new in therapeutics. The burning of sulfur candles to disinfect the air, the spraying of operating rooms with anti-bacterial agents; the inhalation of smoke of asthma powder and steam inhalations are examples of aerosol therapy. Aerosol therapy has been effectively carried out with the aid of various mechanical units such as atomizers, nebulizers, vaporizers and aerosolizers.

What is of recent advance in therapeutics is the use of aerosol dosage forms which are dispensed from a container by the use of a propellant. It is this type of product which offers great possibilities to the pharmaceutical industry and with which this paper is mainly concerned.

Advantages of Aerosol Therapy

There are many advantages of aerosols which indicate their use as a medicinal dosage form. A major advantage is their ease of application. Such application is speedy, convenient, uniform and necessitates very little manual contact with the medicament. Another significant advantage is that the dosage may be controlled by the use of metered valves. Topical medicinal aerosols applied to an injury produce a minimum of irritation to the treated area. Aerosols also can be designed to dry very rapidly when administered topically.

Since an aerosol dosage form is gas-tight, there is no access of air to the product. This prevents contamination, evaporation during periods of non-use, and preserves the potency of the active ingredients through the elimination of oxidation, etc.

Many drugs may be administered as aerosols for inhalation therapy. Much work is being done presently in this field. The advantages of this type of therapy are the possibility of obtaining a high concentration of drug over a limited area, almost instantaneous response to the medication and less danger of decomposition of the medicament since it does not pass through the gastro-intestinal tract.

Even though an aerosol dosage form may be more expensive than other forms of medication, its efficiency may actually make the aerosol preparations more economical. The sale of aerosol products has increased annually despite the generally higher price of the aerosol package as compared to the conventional one.

Pharmaceutical Applications

It has been estimated that there are close to one hundred aerosol dosage forms on the market today. These include such products as topical anesthetics, burn remedies, athlete's foot preparations, and other products intended for foot use, poison ivy lotions, spray bandages, skin balms, adhesive tape removers, throat sprays, nasal sprays, topical antiseptics, and aerosols intended for inhalation therapy.

It has been reported that slightly less than a million and a half aerosol packages of medicinal and pharmaceutical items were produced in 1956. Total production of these products is almost certain to increase many fold during the next few years.

Most pharmaceutical aerosols being used today are employed topically. It is very likely that aerosols intended for local application to the mucous membranes and to other tissues of the body will be introduced at a rapid rate in the very near future.

In the remainder of this paper, possible pharmaceutical applications for aerosols will be presented. It should be understood that none of the suggestions to be presented is based on clinical studies. Furthermore, much work remains to be done concerning the physical, chemical and pharmacological properties of the propellant-concentrate combinations before pharmaceutical aerosols may be intelligently formulated. The suggested applications are the result of brainstorming on the author's part based on his understanding of pharmaceutical dosage forms and their applications. It is hoped that the presentation of these thoughts will stimulate the thinking of the audience concerning the possible pharmaceutical applications of aerosols.

Dermatologicals

The largest number of pharmaceutical aerosols being marketed today are for topical use. It is not unrealistic to philosophize that most externally used products, such as ointments, creams, liniments, lotions and powders, may someday be dispensed as aerosols. Certainly there are many advantages of the aerosol dosage form as compared to the conventional ones to indicate this.

One is all too familiar with the fact that there is much waste and messiness produced in the handling of most externally used products by both physician and patient. The time consumed, the non-uniformity of application and the irritation caused by the manual application of the medication are other well-known disadvantages. The use of these types of products in the form of aerosols would eliminate most of these objectionable features.

Emulsion technology would undoubtedly be of great importance in the preparation of many pharmaceutical aerosols, since many ointments, creams, liniments and lotions would, of necessity, be emulsions. In this respect, much must still be learned concerning the physical and chemical relationships between the propellants, the active material, and surface-active agents.

There has been much interest shown in the preparation of foot products as aerosols. There are presently on the market pharmaceutical aerosols intended for use on the feet as antiseptics, deodorants, drying powders, cooling preparations, astringents and fungicides. This is one area where aerosols have been applied and where more work is indicated. It is logical to assume that because of the advantages of aerosol dosage forms, most preparations in this field will be aerosols in the near future.

Several pharmaceutical aerosols intended for use as antiseptic applications have appeared on the market in the last few years, some containing antibiotics. These have appeared as both liquid and powder aerosols. The field of anti-infective aerosols, containing any of the commonly used antiseptics or antibiotics, is wide open. Once again, much remains to be learned concerning the relationships between propellants and the anti-bacterial agents employed.

Pharmaceutical aerosols intended for the treatment of poison ivy have appeared on the market. These preparations are of the lotion type. Much remains to be carried out in this area.

Other examples of dermatological classes of preparations which warrant study as aerosols are: steroid-containing topical products, vitamin-containing products, antihistamine preparations, calamine and/or zinc oxide-containing preparations, sulfur and/or resorcinol products, tar-containing products, fungicides, scabicides, burn preparations, anti-pruritics, protectives, cleansers, emollients, and lubricants.

The use of the spray bandage aerosol is of interest. Some limited work has been done in this field. This area is one which warrants further study because of its popular appeal. It should prove interesting to investigate the possibility of impregnating the spray bandage with various classes of dermatological medicaments, such agents being therapeutically active when sprayed on the skin. Whereas there are many factors that would make this appear difficult at this stage, the appeal such products would have warrants their study.

Ear, Nose and Throat Preparations

One area where it appears that aerosol pharmaceuticals may have

great application is in ear, nose, and throat therapy. A few such aerosols, especially for use in the nose and throat, have already been developed. Toxicity and tissue irritation studies must necessarily be carried out in order to establish definitely the safety of the propellants used in these types of preparations.

It seems logical that medicaments may be able to penetrate the nasal tract more effectively and especially the sinuses if administered in the form of an aerosol. Careful studies undoubtedly could correlate the degree of penetration with the particle size of the active constituents in the aerosol preparations.

It is an all too familiar fact that it is difficult to obtain effective concentrations of medicinal substances on the mucous membrane linings of the throat. Much is left to be desired in throat therapy with troches and gargles, since there is not sufficient contact produced between the drug and the throat when these dosage forms are employed. The throat spray, produced by the use of an atomizer, has been resorted to for more effective local throat therapy. In this respect, aerosols appear to have a definite role in the formulation of antibacterial, anesthetic, and astringent preparations intended for throat therapy.

Very little has been done in the development of aerosols for use in the ear. It appears that there should be a better drug penetration of the middle ear region if medication is applied in the form of an aerosol. Conditions such as "otitis media" may be treated locally in a more successful manner by the use of aerosols.

Dental Preparations

Some limited work has been done in the development of pressurized dosage forms for dental use but much more work is indicated. Products such as local anesthetics, anodynes, emollients, astringents, and antibacterials may be conveniently and effectively administered as aerosols. Interest is being shown at present in dental aerosols intended for use in oral prophylaxis. Breath sweeteners, stain removers, and tooth polishers are types of products which may shortly be utilized as aerosols.

Rectal and Vaginal Preparations

The development of pharmaceutical aerosols for possible use in the treatment of local rectal and vaginal conditions has not been significantly explored as yet. By the use of specially shaped containers and valves, it should be possible to apply medication locally to those areas in a more convenient and effective manner than has heretofore been possible.

In this respect, effective use may be made of aerosol dosage forms in applying anti-infectives, deodorants, and perhaps contraceptives to the vaginal tract. A deeper penetration of the tract would appear to be possible if a pressurized dosage form is used.

In the case of rectal therapy, use may be made of aerosols as a dosage form for the application of local anesthetics, anti-pruritics, anti-infectives, and astringent medication.

Another possible application of rectal or vaginal aerosols is for the administration of drugs intended to be absorbed systemically. Rectal and vaginal suppositories are sometimes utilized in therapeutics as dosage forms for drugs that are intended to be absorbed systemically when it is not possible to obtain such absorption by administering the medication either orally or by injection, or where a more desirable therapeutic effect is obtained when the drug is administered in such a manner. Examples of drugs administered in this way are the barbiturates, hormones, and bronchodilators. Studies are indicated, therefore, in order to establish whether various medicinal agents are absorbed through the mucous membrane linings of the vagina and rectum and whether their use as aerosols for systemic absorption is indicated.

Inhalation Therapy

Inhalation therapy has been used effectively in medicine for a number of years. The apparatus used in such therapy is usually the atomizer. However, the use of this instrument is often considered to be quite inconvenient to the patient because of its size, wastefulness, and time consumed in its operation. It is also difficult to control particle size when such an instrument is employed.

Recently, aerosol dosage forms have been introduced for inhalation therapy. Such forms of administration offer many advantages to the patient. Besides their highly effective therapeutic usefulness, they have added convenience to inhalation therapy due to the development of specially-designed packages and the introduction of metered valves which permit the accurate control of dosage. Only a few such aerosol products are commercially available at present and tribute must be paid to the Riker Laboratories for their pioneering work in the field of inhalation aerosols as exemplified by their Medihaler line.

It is well known that many drugs are capable of being absorbed rapidly from mucosal cells by inhalation. In such cases, there is prompt entrance of the medicament to the blood through the alveolar membrane; in fact, in some cases, inhalation therapy approaches the speed of intravenous therapy in its onset of action.

The effectiveness of a medicament in aerosol form is dependent to a high degree upon particle size. For example, the particle size of aerosols intended for application to the lungs must be small enough to be carried by the air stream through the nasal cavities, pharynx, larynx, and trachea, and yet large enough so that they will be deposited on the lung tissue.

Before intelligent developmental work may proceed in the field of inhalation aerosols, much basic information must be obtained concerning the physical and chemical relationships between the propellants and medicaments which would find use in inhalation therapy. The factors which influence the localization site of the aerosolized medicaments (pressure, particle size, etc.) would also have to be established.

Many inhalation aerosols have been intended for their local pulmonary action. Thus penicillin and streptomycin aerosols have been administered by inhalation as adjuncts in the treatment of bronchopulmonary dis-

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ease; epinephrine aerosols have been used in the treatment of bronchial asthma; and aleudrine, cocaine, procaine, lobeline or picrotoxin, taken by a human subject, can cause an immediate increase in lung volume without producing systemic effects. Substances such as ephedrine, amphetamine, neosynephrine, aminophylline, and ammonium chloride have been used as well as epinephrine as pneumodilating agents in the treatment of bronchial asthma.

It has also been shown that significant systemic action may be demonstrated when certain medicinal agents are administered as aerosols. Among these may be included various vasoconstrictors, vasodilators, cardiotonics, diuretics, convulsants, central nervous stimulants and depressants, hormones, and antibiotics. In these cases, the medicaments are not localized on the pulmonary tissues but are actually absorbed into the blood.

Some consideration has also been given to the administration of serums, antitoxins, antigens, pollen extracts, histamine, antihistamines, vaccines, and anti-tubercular drugs in the form of aerosol inhalants.

The field of aerosol inhalants has hardly been scratched. Because of the present-day convenience of inhalation therapy brought about by the development of the aerosol dosage form, much investigational work has been stimulated in order to establish which therapeutic agents may be administered with pharmacological advantages of inhalation. It appears that this field is almost unlimited and one to which pharmaceutical manufacturers should turn their attention.

The aerosol age has definitely arrived and is growing daily. Because of the fact that aerosol application of medicinals offers numerous and definite advantages over the conventional means of drug administration, and because of high consumer acceptability of the push-button package, many pharmaceutical manufacturers are considering the marketing of aerosol dosage forms. It is hoped that this brief presentation will aid you in your consideration.★

Pharmaceutical Symposium . . .

Aerosol Containers*

by W. Earl Graham
Manager of Technical Services
Can Division
Crown Cork & Seal Company, Inc.

AEROSOL packaging may be said to have originated in the Department of Entomology, United States Department of Agriculture, Beltsville, Md. , in 1941 and 1942 when Dr. Lyle Goodhue and William N. Sullivan perfected the first aerosol insecticide formulation and container, the "insect bomb" of World War II.

This resulted from the need of the Armed Forces to combat insect-borne diseases throughout the world, with approximately forty million containers being used during World War II. A public use patent in Goodhue's and Sullivan's names was made available to industry in manufacturing these early "bombs" as well as the later civilian products.

The first Army aerosol container was truly a heavy-walled steel "bomb," quite effective in use, but lacking in package appeal for civilians. However, in the early years following World War II, the heavy, high pressure bombs were distributed in the civilian market as returnable, refillable containers. In 1946, however, the can companies began experimenting with modified beer cans for aerosol packages. The first commercial carload shipment of the new "low pressure" aerosol can was made by Crown Can Company in October, 1946 and, in 1947 other can manufacturers and aerosol loaders entered the market. 1957 is considered then the tenth anniversary of the start of the "low pressure" consumer aerosol industry.

The modified beer can made available to the industry a low-price one-trip container technically more adaptable to corrosion-resistant tinplate and interior coatings and, at the same time, permitted a lithographed package more easily displayed and used. As a result, the old "high pressure" bombs have now all but disappeared from the market.

The first low pressure aerosol containers had the valve attached or "staked" directly into the can cone top or attached to a one-inch "cup" which is clinched into the dome portion of the can. Over the years, the one-inch "cup" or "cap" has become the predominant form of valve attachment. This permits the industry to standardize one method of sealing, providing wide flexibility in valve choice with one form of can closure.

There are now available to the pharmaceutical industry aerosol con-

* Presented at "The Aerosol Symposium For The Pharmaceutical Industry," August 20, 1957, Philadelphia College of Pharmacy and Science.

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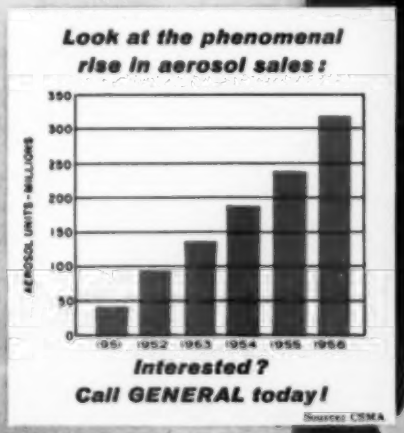
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tainers of tinplate (or blackplate i.e. untinned steel), glass (both plain and plastic-coated), aluminum and, most recently, plastic.

The tinplate (or blackplate) cans have predominated in usage. In 1956, approximately 400 million aerosol products of all types were filled. About 320 million were non-food products and 70 to 80 million were foods. Of the non-food products, according to CSMA survey figures, about 15 million were in glass. Data on aluminum containers has not been available, but it is estimated that their average yearly usage in the United States has not been over one million units. We can see, then, that aerosol containers in the United States have been predominantly of tinplate, though, glass containers, particularly the plastic-coated type, have shown a healthy growth since their introduction two or three years ago. Recently there has been renewed interest in aluminum. Plastic aerosol containers have been test-marketed and are being used commercially in 1957.

AS A background for further discussion, a review of the pressure classification used in the industry is of interest. This particularly in reference to I.C.C. regulations. Since aerosols contain compressed gases, they are classified for interstate commerce shipment under Tariff No. 9 as hazardous articles. As such, however, they are exempt from all but a few minor regulations. We might add that even carbonated beverages, since they also contain compressed gas, are listed in Tariff 9 but are entirely exempt from regulations.

Pressure range classifications with the commonly used terminology are shown in Table 1.

Containers and products in the ultra or sub-low pressure range (i.e. under 25 lbs. p.s.i.g.) are exempt entirely from I.C.C. regulations, as are containers under four fluid ounces and under two inches in diameter. The bulk of aerosol containers are filled in the low-pressure range (25-40 lbs. p.s.i.g.). It is in this range that the propellant liquefied gases give the most efficient aerosols with valves available. This range also permits usage of containers with pressure resistance providing adequate margin of safety. Some products, however, are more advantageously formulated in the 40-60 p.s.i.g. range. For this 2P or medium pressure range containers are available in the drawn (no side or top seam) tinplate and blackplate containers.

TABLE 1

Pressure Ranges
Aerosol Products
(Based upon I.C.C. regulations)

Under 25 p.s.i.g.	Ultra (or Sub) Low Pressure
25 — 40 p.s.i.g.	Low Pressure
40 — 60 p.s.i.g.	Medium Pressure (2P)
Over 60 p.s.i.g.	High Pressure

p.s.i.g.—pounds per square inch gauge

The I.C.C. regulations provide a maximum 18.6 fluid ounce capacity and state that each filled container must be tested in a water bath until contents reached 130°F. without evidence of leakage or distortion. Certain exemptions are made for foods and biologicals which might be harmed by this temperature treatment.

High pressure containers, such as the insect bomb, are required to be of heavy steel welded wall construction and, as indicated earlier, are now an insignificant part of the industry.

What are the factors which will determine the choice of a suitable container for pharmaceutical aerosols? These are varied and decision can be made only after careful technical and commercial considerations.

1. *Size* — Aerosol containers are available of one fluid ounce or less, up to 18 fluid ounces capacity. In the selection of size, costs, and consumer usage are decisive — an 18 fluid ounce can may be preferred for paint while for an antibiotic, a one-fluid ounce package is superior.
2. *Cost* — This factor is all too prevalent today and is self-evident.
3. *Merchandising Appeal* — Method of distribution whether in drug or grocery store, or for the trade, professional or consumer market is vital in judging the most suitable container.
4. *Pressure Characteristics* — The satisfactory performance of a pharmaceutical aerosol will depend upon the best combination of valve, product formulation, and propellant. The latter two are decisive in determining the resulting pressure in the container. The choice of container should be dictated by this working pressure not only at the normal reference temperature of 70° F.; but also under conditions governing normal storage, shipment, and use of the product.

   The container finally selected should fit into the I.C.C. pressure requirements outlined above and provide ample margin of safety to protect the consumer.
5. *Shelf Life (Corrosion Resistance) Properties* — This is a factor which, along with the product's stability, must receive the most thorough technical analysis before a product is released for marketing. The container must contain the product for its expected commercial life and to do so must be "neither affected by nor significantly affect" the product.

   Through a confidential knowledge of the composition of your product, manufacturers can specify the most probably suitable container for your purpose. This should be confirmed by room temperature and accelerated (100°F., and, in some cases, to 130°F.) corrosion-storage life tests. Too hasty marketing of a new product without adequate shelf life testing can be disastrous.

   Manufacturers of containers will, where practical, modify their products to give you a more desirable package. This from both performance and merchandising viewpoints. We wish to point out, however, that in some cases a reformulation of the pharmaceutical product may be necessary, not only to produce a satisfactory aerosol product, but also to permit the use of available containers.

The Chemical Specialties Manufacturers Association, Aerosol Division, through its Scientific Committee, has been invaluable in guiding the growth of the aerosol industry. Of its many publications, that section of its *Aerosol and Pressurized Packages Pre-marketing Product Check List* dealing with containers is particularly pertinent to this paper. This is reproduced in Table 2.

Steel Containers

Steel containers are available in blackplate and tinplate. (Table 3) The latter is steel with a thin coating of tin deposited either electrolytically or by hot dipping on the surface. The tin coating weights available are .25, .50, .75, 1.00, and 1.25 and 1.50 pounds per base box (31,360 square inches of plate). Generally speaking, increased tin coating weights give increased corrosion resistance. Tinplate cans may be either plain or with an organic coated interior. Blackplate, used only in the drawn seamless type, is always coated. Coatings are "lacquers" or enamels composed of resins of the phenolic, alkyd, vinyl, or epoxy types which are sprayed or roll coated on the plate and baked or cured into a thin chemical resistant film. Soldered side seam cans may also have an interior side seam stripe coating applied after soldering to reduce corrosion and provide prolonged shelf life.

The variety of tin coating weights and organic baked coatings gives industry a wide choice of interior linings suitable for the particular pharmaceutical product to be packaged. The objective in the choice of container specifications is a package which will adequately contain the product for its expected shelf life at the lowest possible cost.

Tinplate containers usually are exterior-decorated by lithographing, or paper labels may be used.

Plastic Coated Bottles

These are glass bottles coated and protected on the exterior with a polyvinyl chloride film. Practically all designs possible in regular glass can be achieved with the plastic coated aerosol container. Thus the display appeal of glass is combined with the shatterproof safety of plastic. Two, three and four-ounce capacity containers are available. They may be decorated by use of colored plastic coatings or by silk screening.

Manufacturers advise that such plastic-coated glass bottles will withstand internal pressures far in excess of the normal 15 to 25 pounds loading pressure. A desirable glass aerosol is one which will withstand a minimum hydrostatic pressure of 150 p.s.i.g. for one minute.

I.C.C. has not as yet provided regulations dealing specifically with glass aerosols. In order to remain in the non-regulated category, glass aerosol manufacturers have recommended that no package be formulated at a pressure over 25 p.s.i.g. at 70°F. This is in the sub- or ultra-low pressure range.

Uncoated Glass Aerosols

These have been packaged under pressures of 12-15 p.s.i.g. The choice between a coated and uncoated glass

TABLE 2

Aerosol and Pressurized Packages
Pre-marketing Check List

Container and Valve Components vs. Formulation
Accelerated Aging at Laboratory Level in Actual Container with Valve as Well as Individual Components Under Pressured Glass

1. Does product affect container?
   a. Effect on internal coating, lacquer or plate
   b. Effect on seam component
2. Does product affect valve mechanism?
   a. Metal components
   b. Elastomeric seals
   c. Plastic components
3. Performance of valve with formulated product
   a. Spray Characteristics
   c. Valve action

Valve and Container Selection

1. Suitability of container to formula (See II.)
2. Bursting strength of container
3. Effect of formulation on outside finish of container
4. Susceptibility of valve to clogging
5. Delivery rate of valve
6. Spray characteristics of valve
7. Valve attachment to dispenser
8. Syphon tube selection
9. Valve testing prior to use
10. Commercial history of containers and valves
11. Sales appeal of container and valve
12. Adaptability of valve and dispenser to other products
13. Tamper-proof seal
14. Packaging of empty dispensers (receiving cartons)
15. Packaging of filled dispensers (shipping cartons)

(From Manual for Vendors and Fillers of Aerosols Chemical Specialties Manufacturers Association New York, New York)

TABLE 3

Steel Aerosol Containers

3 *oz.*	6 *oz.*	
202 x 214	202 x 314	
	202 x 508	
	202 x 411 (seamless)	
8 *oz.*	12 *oz.*	16 *oz.*
202 x 406	211 x 413	211 x 510
	214 x 411 (Seamless)	211 x 604

The above are nominal or approximate capacities
Note: 202 x 214 designates a cylinder 2 2/16 inches diameter X 2 14/16 inches height.

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C Finger tip control operates the molded plastic tube for a metered spray. When not in use, cap and tube become one, for positive closure.

D Here's one for the nasal. Clever cap arrangement has multiple advantages for a variety of uses.

E Here, too, plastic is a means-to-an-end, when coupled with a VCA metered valve. Simple operation.

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aerosol container should be made only after a thorough review of the growing technical literature on the relative serviceability and performance of both types.

Aluminum Containers

Drawn aluminum containers of two- to four-ounce capacity have been utilized in the aerosol industry from its earliest history. These are manufactured by the impact extrusion method similar to that used on collapsible tubes. They may be interior coated by flushing or spraying while the exterior is coated and lithographed. More recently, larger aluminum drawn cans up to 12 fluid ounces, and as small as one-fluid-ounce or less capacity have been made available to the industry.

The future of aluminum cans, particularly in the larger sizes, depends in part upon the relative cost of aluminum compared with steel i.e. tinplate. As with all containers, corrosion resistance of aluminum containers should be thoroughly evaluated before release for marketing.

Plastic Containers

Plastic aerosol containers which have been considered thus far are of the nylon, melamine formaldehyde, and phenol formaldehyde types. They may be fabricated by blow molding or injection molding. Sizes generally considered have been in the one-, two-, and four-ounce range.

Wall thickness has been such as to produce rigid containers sufficiently pressure resistant, lightweight and non-corrosive. Non-permeability to solvents and propellents is an essential prerequisite for plastic containers. Manufacturers of these containers are in a position to offer data on various formulations.

This rather sketchy review demonstrates that pharmaceutical manufacturers have a wide choice of containers for their growing list of aerosol products. The manufacturers of all these containers are ready — actually eager — to help you fulfill your needs.★

Pharmaceutical Symposium . . .

Valves for Pressurized Packages*

by Walter C. Beard, Jr.
Director of Research,
Risdon Manufacturing Co.

TWO factors determine the performance of a pressurized package: the formulation and the valve. The interaction of these two is such that one cannot readily be discussed without reference to the other. With this in mind, I propose to consider with you how valves work; classify the different types of valves; and show the specific function of the valve in relation to the formulation and mechanical requirements of the package.

The primary purpose of the valve is to regulate the flow of product from the container. It provides a means for discharging the desired amount when needed and prevents loss at other times. But beyond fulfilling this simple "on and off" requirement, the valve exerts a major effect on the character of the dispensed product. For example, a product formulated to produce a foam can be dispensed as a spray or as a wet stream simply by the use of different actuators or push buttons on the valve. In actual practice, efforts are made to select the proper propellants and ratios of propellant to product to produce a spray, a jet, or a foam (depending on what is wanted). Nevertheless, variations of performance within these categories can be achieved by modifications in the structure of the valve.

BEFORE considering how valves are made to assist in delivering product in a specific form, it may be helpful to look at a simple, basic aerosol valve, list the various components, and note what each does. Figure 1. gives a cross-section view of a valve mounted on a glass aerosol bottle. The valve core (B) is seated in a snugly fitting rubber valve seat (C). The two orifices (I) are 180° apart and extend through the walls of the core into groove (K) which circles the lower end of the core. Valve seat (C) is a snug fit in valve cup (D), to which is attached the dip tube (F). Gasket (H) provides a seal between the valve and the bottle. All of these parts are held together and to the bottle by a ferrule (A) which has been curled under the lip of the bottle. Actuator (E) carries or has formed in it the spray orifice and also provides a means for operating

* Presented at "The Aerosol Symposium For The Pharmaceutical Industry," Aug. 20, Philadelphia College of Pharmacy and Science.

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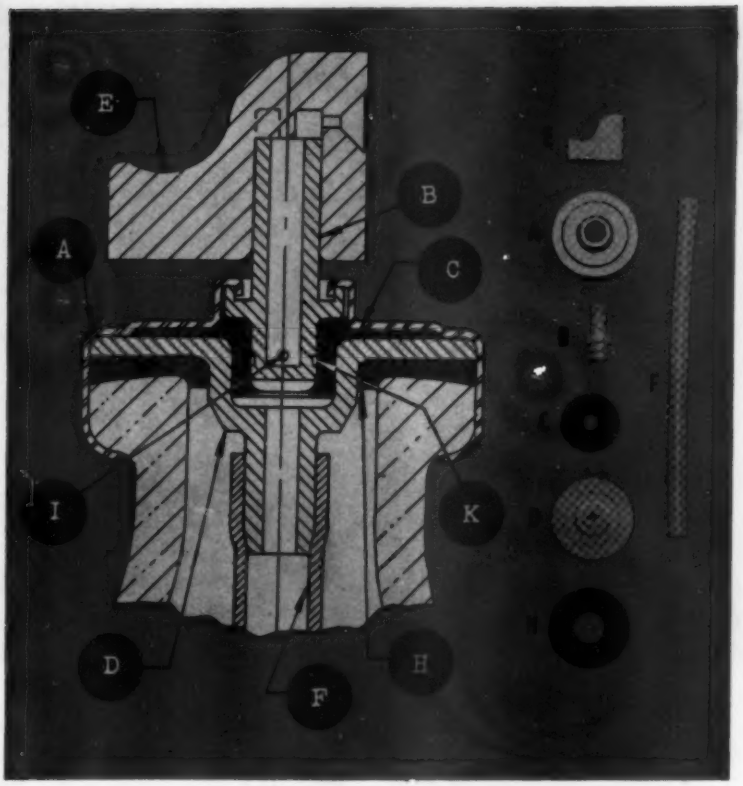


Figure No. 1

the valve. If the actuator is pushed at point E, the core will be tilted and deflected from the seat at the lower left hand corner. The groove will be uncovered and will allow the pressurized product to rise through the dip tube, pass through the orifices, rise through the core, and spray out through the terminal orifice. When finger pressure is removed from point E, the core snaps back to the closed position, due to the elasticity of the rubber seat. A similar valve adapted for crimping in a standard 1" opening aerosol can is shown in Figure 2.

In one way or another, all spray valves have a similar series of orifices with communicating passages, called expansion chambers, and a shutoff point. Orifice diameters may be as small as .010" or as large as .040", but they average about .016". Ordinarily the innermost orifice is the smallest, with succeeding ones becoming progressively larger, say .016", .018", .020". The size and number of orifices affects the flow (spray rate) and, in the case of sprays, the degree of atomization (particle size) of the issuing product.

Note what takes place in a valve dispensing a typical space spray: When the propellant solution passes through the first orifice, the pressure drop is great enough to cause the liquefied propellant to expand and begin to boil. Passage through subsequent orifices results in a further expansion and violent boiling which atomizes the liquid product being swept along with the rapidly expanding gas stream.

As a matter of reference, a typical space spray aerosol insecticide, pressurized to about 40 psig at 70°F, will be discharged at the rate of about one gram per second. Most of the particles in the spray cloud will be 30 microns or less in diameter, and none will be likely to be over 50 microns. In this case, the active ingredients are dissolved in 15% kerosene pressurized with 85% of a propellant consisting of 50/50 Propellant-12/Propellant-11.

Basic spray valves, such as the ones illustrated, are the types used for practically all products that are soluble in the propellant. This includes insecticides, room deodorants, hair lacquers. colognes, paints, and dozens of other oil or alcohol base preparations. The spray pattern is a characteristic, narrow plume, with particles fairly evenly distributed to form a solid cone. Special actuators may be used to produce flat or fan-shaped patterns. Best performance is obtained when pressures are maintained above 20 psig.

Foam Valves

Valves for foam or aerated products usually have only one expansion orifice, the one at the seat. Following this is a single expansion chamber which serves as a delivery nozzle or applicator. It is sufficiently large in volume to permit immediate expansion of the pressurized product to form the familiar ball of foam. As demonstrated earlier, the same formulation will be discharged as a solid stream when dispensed with a valve and actuator having small orifices and expansion chambers. Under these latter conditions, the ball of foam will begin to develop where the stream impinges on a surface.

This rather interesting performance is utilized by some pressurized surgical soaps on the market.

Because of their large openings, foam valves may lend themselves for use with viscous materials such as syrups, creams, and ointments. As with other types of valves, a dip tube may or may not be used, depending on whether the container is to be operated in an upright or upside down position.

After a foam product such as shaving cream has been used, a small accumulation of foam will often be seen on the end of the actuator. This buildup is not due to leakage or slow shutoff of the valve, but to the expansion of the residual formulation in the actuator.

Valves With "Three-Phase" or Mechanical Breakup Actuators

Frequently products are found that cannot be dissolved in organic solvents but which are soluble and stable in water. Most propellants of the liquefied gas type are not freely soluble in water and layer out (i.e.,

sink or float when added to water base products). Nevertheless, it may be possible to spray such products by the use of valves designed for the purpose. For example, the valve may be equipped with what is known as a "three-phase" or mechanical breakup actuator. The first term is derived from the physical system formed in the container when the propellant, water, and propellant vapor exist as two liquid phases and a gas phase, respectively. The second term derives from the manner in which the actuator develops a spray. Within the actuator is a swirl chamber or other means for causing the water to leave in the form of a thin film which breaks up as it is projected into space. The same principles are employed in many oil burner nozzles and garden sprayers.

The propellant furnishes the energy to force the product through the valve, but in this case little or no propellant is lost and comparatively little is needed to maintain the pressure in the container. Sprays produced in this manner do not have the small particle sizes found when the propellant issues with the product. The spray pattern is a typically short, wide, hollow cone: a feature particularly useful for the low velocity application of product over a wide area at close range.

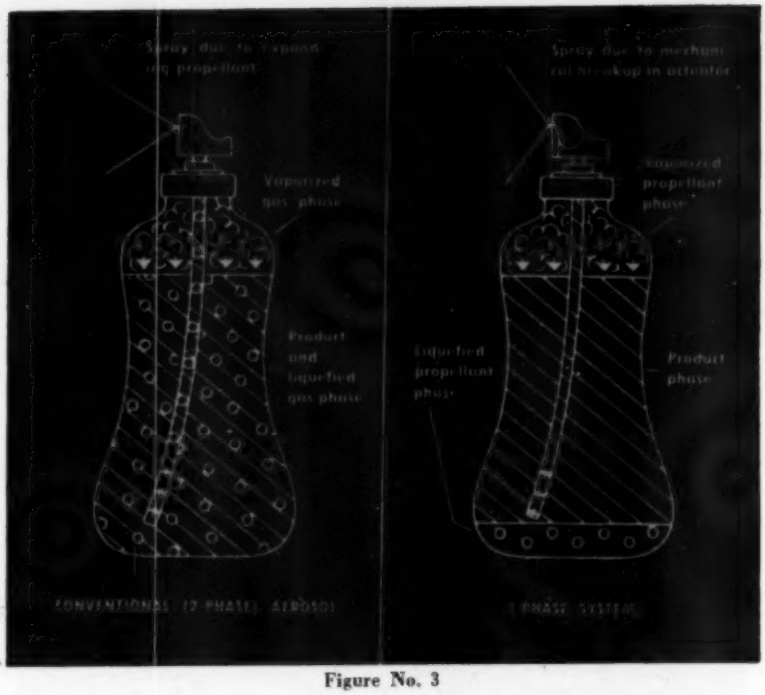


Figure No. 3

When used with conventional or two-phase aerosol systems, these actuators augment the atomizing effect of the propellant and provide a means for developing acceptable sprays at lower pressures and with lower amount of propellant than normally required. This same feature enables them to improve the spray obtained with water base systems in which the propellant is emulsified or dispersed in the product.

Valves with "three-phase" actuators usually have an appreciably lower spray rate than valves with simple expansion orifices. The lower spray rate and the soft, wide cone spray pattern tend to make a significant reduction in the chilling effect of an aerosol spray on the skin.

Valves for Powder Dispensing

The preparation of dry powder "aerosols" requires especially careful consideration of formulation and valve. From the standpoint of the formulation, it appears wise to avoid materials that may be slightly soluble in the propellant, for the reason that particle sizes may increase by crystal growth on standing. It is believed that caking of powder, resulting from sedimentation on standing, can be eliminated or minimized by the use of a propellant having a specific gravity close to that of the powder.

Upper limits on the size of powder particles depend to some degree on the valve to be used. Talc meeting the following specifications is often used for demonstration purposes at concentrations of 10% to 20% in a propellant: 99.8% to pass through a 200 mesh screen and 92.4% to pass through a 325 mesh screen. Thus,

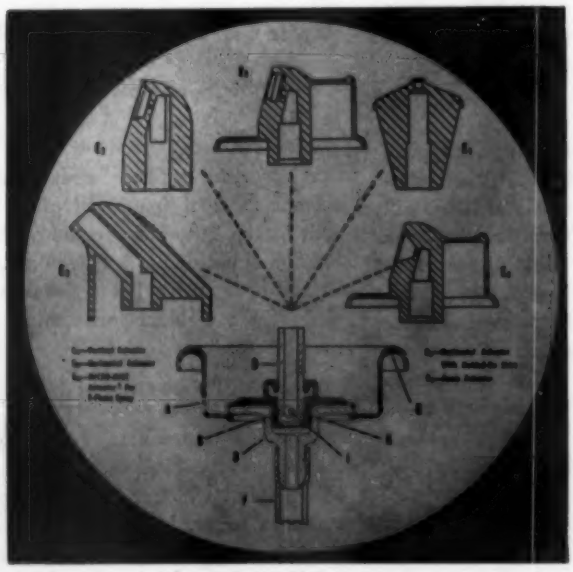


Figure No. 2—Valve Actuators

virtually all the particles would be under 75 microns, and most of them would be under 45 microns in diameter.

Valves having a high seating pressure, with the seat close to the terminal orifice, appear to work best with formulations having much over 10% solids. Many powders are effective at a 1% level and can thus be handled by some standard or slightly modified space spray valves.

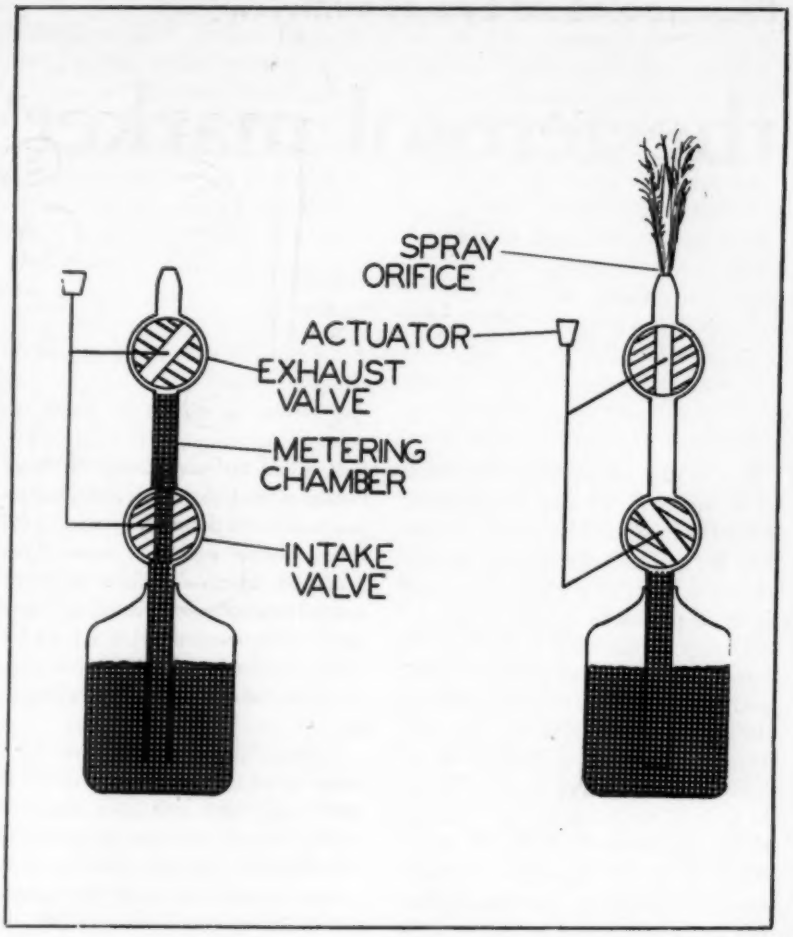
In order to prevent the accumulation of solids at the valve seat, powder valves are usually operated wide open. This results in the discharge of a large plume of dry powder, maybe three feet long and a foot in diameter: fine for dusting vegetables but cumbersome in the dispensary or home. The size of the plume can, however, be reduced materially if the percent solids is kept low enough to permit the use of a valve with a low spray rate.

Metering Valves

Valves that deliver a measured quantity of spray at each actuation are called metering valves. The metering action is obtained by isolating a portion of the pressurized product in a chamber within the valve and then allowing this portion to expand and spray independently of the main charge in the container. The volume of the chamber in which the isolated portion is held determines the quantity of spray per shot. However, trade practice has been to take no account of the specific gravity of the product-propellant mixture and to list valves with different capacities as being capable of delivering a certain number of milligrams per shot, viz. 50 mg, 100 mg, etc. This is understandable when it is realized that the valves are not usually called on to deliver to closer than ± 20% of the stated quantity.

Sprays, foams, powders, and water base emulsions can be dispensed with varying degrees of success by metering valves. At this time no feasible method has been reported for using them with the three-phase systems. The problem arises because no propellant is available in the metering chamber to drive the product through the valve and actuator.

Cutaway view of typical metering valve showing operation.



Aside from delivering predetermined doses, and thus minimizing overdosage of active compounds, metering valves offer still another safety feature from the standpoint of aerosol packages for medical uses: they prevent the discharge of large volumes of comparatively high pressure gas into body cavities. This is particularly true for nasal and oral applications. Even when used on metering valves, inhaler actuators may have provisions for the relief of possible back pressures.

Specialty Valves and Closures

Some products may require special or custom-made valves or closures. In the aerosol paint field, for example, valves are available with removable spray heads for rinsing in solvent; at the same time, providing direct access to the valve seat for cleaning purposes. Single shot mechanisms are used on some fire extinguishers. They operate by means of break-off tubes, removable plugs, or frangible seals. Fumigants, such as methyl bromide, may be packaged in containers having blind seals. These seals are punctured to release the entire contents of the container.

Reusable valves, like refillable aerosol containers, do not appear to offer great promise, at least in the American market. The closures used on containers made to accept reuseable valves require almost as many parts and as much plumbing as a complete valve; therefore, little gain results. There are, however, certain applications where the container may be equipped with a closure and pene-

(Continued on Page 76)

Pharmaceutical Symposium....

the aerosol market*

by Thomas D. Johnson, Jr.
Manager, Aerosol Propellant Sales
E. I. duPont de Nemours & Co.

AS SOON as we think the word "market," we are immediately bound to think of the problem of selling, the problem of satisfying the desire of a buyer — whether this buyer is at the manufacturing, retail, or consumer level. Since each of us is interested in aerosol products (and particularly in their ultimate value as drug or pharmaceutical aids for personal well-being) then whether we do it consciously or not, we must think in terms of the consumer and what he needs, and what he likes. We must think of how our respective products, services or abilities can serve to satisfy a consumer need and at a price that is compatible with his desire to have this need satisfied.

Fortunately, the aerosol method of dispensing, as a means of packaging goods, has been and is continuing to be proven as a means of satisfying given desires at a price. We should first consider broadly just what this aerosol market is today, in the eleventh year of the anniversary of the sale of the first commercial aerosol. Last year about 325 million units of aerosol products, were produced, with a value of about $325 million. In ten years there have been more aerosols produced than there have been minutes since the birth of Christ. If all the aerosol containers that have been produced were laid side by side, one layer deep, they would fill a four-lane highway from Washington to Boston and still have enough left over to take care of the clover-leafs, underpasses, etc. on the way. What this all means is that in ten years we have produced over a billion units of aerosol products and certainly have gone a long way down the road towards convincing the American public of the merits of this type of product.

These billion or so cans have been made up of over a hundred different types of products and have been sold under several thousand different brand names. We know there are still on the market at least 500 brand names of insecticides alone, 200 or 300 brand names of room deodorants, and in the neighborhood of 100 brand names of women's hair spray products — not to mention the fact that every major producer of a shave cream has his product available in aerosol form. Many of the leading television programs are sponsored by companies who are selling the consumer on the advantages of aerosol products. What this all means is that a considerable effort has already been made in familiarizing the consumer with aerosols, and this effort and effect is increasing.

However, of the more than 100 different types of aerosols on the market today, only five — space insecticides, room deodorants, hair sprays, shave creams, and paints — account for about 75% of the total dollar value of all aerosols sold. This is not to say that the other 95 or so product types are not good products; certainly most of them are. To me it means either that the total potential market for many of the products is small or the job of selling them to the ultimate user has been poorly done. Undoubtedly some of the 95 products were ill-conceived and should never have been packaged in aerosol form in the first place.

NOW let us look into the market for aerosol products in some detail. I find it helpful to think in terms of the total market. For example, the total market in the United States is represented by the roughly 170 million people, according to the latest estimate of the Bureau of Census.

You will observe from any breakdown of the trends of population segments in the United States, that each category may represent a particular potential for different types of products. For example, I would think the ultimate potential market for an aerosol hair spray is that segment of the population represented by adult females multiplied by some factor for frequency of usage. The total potential for an aerosol insecticide is *at least* as great as the total number of dwelling units in the United States.

The first product to be dispensed in aerosol form was a true aerosol and was the World War II "bug bomb." For psychological reasons we prefer today to refer to these products as aerosols or "push-button" products instead of "bombs" of one sort or another. During World War II about 50 million high-pressure aerosol insecticides were produced, which

* Presented before the Aerosol Symposium for the Pharmaceutical Industry, at the Philadelphia College of Pharmacy & Science, Aug. 20.

were distributed to the armed forces. Undoubtedly these were of tremendous value, not only in alleviating the insect problem for our fighting men but also, they were found effective — though expensive — as a means of cooling beer or other liquid refreshments! Most important, however, was that 50 million samples were given to users and future prospective buyers.

Aerosol insecticides for flying insects are, true aerosols, in the scientific sense. The Department of Agriculture requires that for an insecticide to be called an aerosol it must produce a spray, the particle size of which is less than 50 microns; 80% of the particles must be less than 30 microns in size. While there has been a relatively steady upward climb in production of this type of product, there have been some lean years. Unfortunately from the point of view of the insecticide marketer, his sales may well be tied up with the total insect population for a given year. Consensus is that the bad dips shown on the curve were primarily due to poor bug years, so far as the insecticide marketer is concerned. We have to be careful in not appearing to be sadistic in our outlook towards aerosol products. It is not that we hope people will have lots of mosquitoes or flies, or cook a lot of cabbage, or fall into patches of poison ivy, but just in case these mishaps do occur then we are ready with the ideal aerosol product to alleviate the misery.

From 1946-1956, while aerosol insecticides were increasing in value, non-aerosols were continuing to sell at a fairly steady rate. The aerosol market then added to the existing market; it did not eliminate it. So that the total household insecticide market has grown. This is important.

THE aerosol room deodorant was the second push-button product to appear on the market, and rapidly gained fairly good acceptance — reaching a total production of 38 million units in 1956. However, the production per household unit was still less than in 1956. When it is recognized that almost all household units have kitchens, and most of them at least one bathroom, certainly the least we might strive for is one room deodorant in each of these rooms in every dwelling in the United States.

I have not discussed to any extent to date the effect of a major marketer on the growth of a product, but it is generally recognized in the industry that the entrance of one major marketer — Colgate in 1955 — had a decided impact on the total growth of aerosol room deodorants.

The production growth of aerosol paints, enamels, and lacquers has not been as spectacular as the previous two listed. It should be noted that the growth to date has been primarily through the efforts of some of the smaller paint companies in the country, or even to efforts of the companies who have no name in the paint field outside of their aerosol products. It has been only within the past 12 to 18 months that some of the major paint companies have entered this field. We have attempted to relate the aerosol paint market to the total paint market that is competitive to aerosols. The best estimate we have been able to obtain is that in 1956 the retail value of trade-sale paints was approximately $900 million. This means that aerosol paints represented about 4% of the total dollar value of all trade-sale paints. I am sure this percentage has surprised many in the paint field.

Three personal type products have also shown very rapid growth. Aerosol hair lacquers, since 1949 have grown the most rapidly of all aerosols; and in 1956 for the first time production was greater than for all insecticides combined. This product is a true example of the impact of the aerosol principle applied to solving a human desire. Prior to the advent of the aerosol hair lacquer, there was no product available which would do a comparable job. There were, and still are, products designed to assist in controlling the hair for application by brushing or dabbing on. They were never very successful. Of course, what we all dream of and hope for is another hair lacquer every year. Perhaps the pharmaceutical industry is now thinking of just such a product!

Aerosol shaving cream, the first important foam product on the market, is, in no sense of the word an "aerosol." It has been called an aerosol simply because it utilizes the same principle for dispensing that is utilized in dispensing such products as insecticides, room deodorants, hair sprays, etc. It would appear that the push-button shave cream has about reached a levelling off point after showing very spectacular growth for several years. Other information indicates that about 35% of men are using push-button shave creams. In the same period of time, the electric razor has progressed from having approximately 25% of the shaving market to 40% in 1956. I think it is safe to say that in the case of aerosol shave creams, major marketers in the shave cream field were forced to enter the aerosol field because of the impact of this product type, which was conceived and first marketed by a company that had no previous experience in the shave cream market. Today every major shave cream producer in the country has his product available in aerosol form.

The growth which has taken place in the production of aerosol colognes and perfumes (or "mist colognes," as many of the fragrance people prefer to call them) is spectacular. In a space of only four years this product has reached a production level of approximately nine million units and already it has captured about 35% of the retail dollar value of all colognes sold in the United States.

THE production record on aerosol pharmaceuticals I am somewhat ashamed of, primarily because we are talking about such a few units. It can only be hoped that, as a result of this meeting and other more personal contacts by many of those in the pharmaceutical field with people who are more closely associated with aerosols, that by next year production may show a two to three-fold increase over last year and perhaps a ten-fold increase by 1960.

Now it is obvious that the consumer of aerosols must find satisfac-

(*Continued on Page* 72)

Pharmaceutical Symposium . . .

Typical Aerosol Propellant Systems*

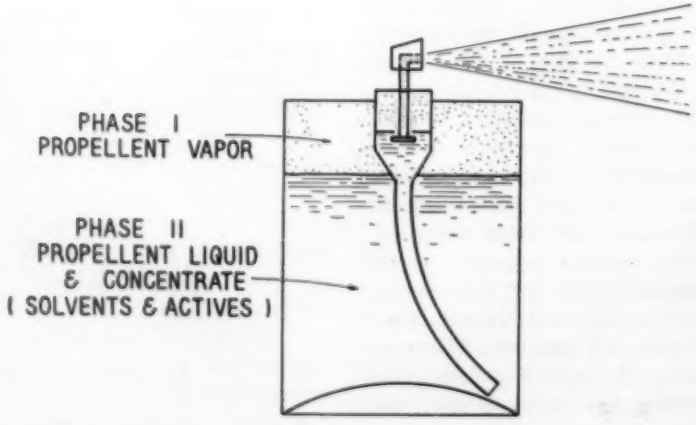
* Presented at the Aerosol Symposium for the Pharmaceutical Industry, at the Philadelphia College of Pharmacy and Science, August 20, 1957.

IN the aerosol field, the term aerosol defines a specialized field of packaging rather than a physical form of particle suspension as defined by Webster.

The classification of aerosol products may be diverse depending upon your point of view. For example, aerosol may be grouped according to propellant types—food or non-food, internal or external application; form of use—such as space, surface or foam; in timing of application—with continuous, controlled-continuous, metered or self-releasing valves; or by certain physical-chemical relationships of the contents of the aerosol. Aerosols are also classified by product group, which the Chemical Specialties Manufacturers Association uses in survey reports to describe insecticides, shave creams, room deodorants and so on.

There are, however, two features in all aerosols which provide a simple basis for classification—the aerosol must contain a propellant and the contents must come out of the package in one form or another. To illustrate this, the following three types of aerosols are classified according to the physical appearance of the propelled contents or the internal contents of the aerosol.

Type I is a *Space and Surface Coating Aerosol.* The appearance of the cloud or wet spray is closely related to the higher proportion of propellant, to the vapor pressure, to the total viscosity and the valve mechanisms which all work together to produce a voluminous cloud or a wet surface spray. The internal conditions show a small vapor space and a large liquid content of propellant, active ingredients and carrier solvents together in solution. When released from the container, a large expansion of the propellant causes break-up of the small stream into extremely small particles. When these range in size from less than a micron to up to 50 microns, they are termed space sprays. When particle size is greater, up to 100 to 200 microns, they are termed wet surface sprays. The space sprays are products represented by such as pharmaceutical inhalants, insecticides, and room deodorants. The wet sprays are colognes, hair sprays, protective coatings and topical sprays. The predominant propellants used are 11 and 12.



SPACE & SURFACE COATING AEROSOLS

Type II is a *Foam Aerosol.* The foam is achieved by a relatively low proportion of propellant which is slightly soluble in a water solution of a foaming agent. Upon release from the container, the dispersed gas expands rapidly in the solution and as small bubbles for considerable length of time—thus the familiar shave cream, hand lotion and shampoo is produced. Propellants 12 and 114 are usually employed in foam aerosols.

Type III is a *three-phase aerosol* having three distinct layers. Starting at the top is the propellant vapor, then a water solution and finally liquefied propellant at the bottom. A wet spray is produced by the mechanical action of an exceedingly small valve orifice through which the liquid is forced by the vapor pressure of the propellant. The vapor layer is continuously replaced by vapors from the liquid layer of propellant.

Pharmaceutical products can be formulated in all three types of aerosols; and, indeed, it may be necessary to devise additional types to suit some pharmaceutical applications.

by David S. Tillotson
Isotron Sales Service
Pennsalt Chemicals Corp.

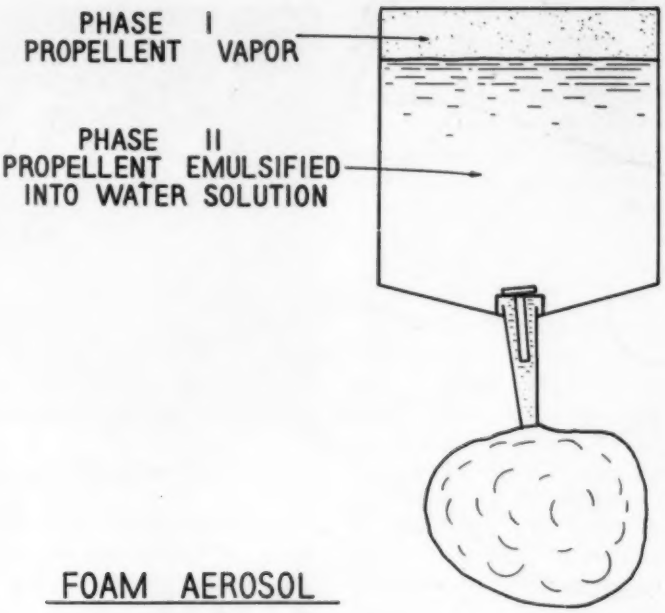
AEROSOLS are one of the keys to modern living. The key to aerosol performance is the fluorinated chlorinated hydrocarbon propellant which provides high chemical purity, reproducible physical properties, non-flammability and safe physiological properties.

The propellants have been numbered according to their chemical composition. For example, Propellant 11 has one fluorine, no hydrogens, one carbon and three chlorines. The last digit indicates the fluorine content. The next to the last digit indicates the number of hydrogens plus one and the first digit indicates the number of carbons minus one, so that Propellant 11 is actually 011 or trichloromonofluoro-methane. As may be observed, the number of chlorine atoms is not directly indicated but is arrived at by difference, using the parent hydrocarbon for reference. The five propellants which are of most concern to the aerosol field are numbered 11, 12, 22, 113, and 114; of primary importance are 11, 12 and 114.

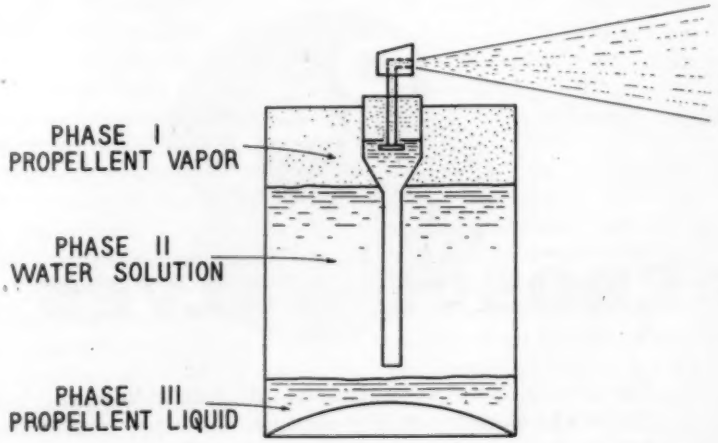
The chemical properties of the propellants depend to a great extent upon the degree of fluorination of the hydrocarbons. Fluorine, which by itself is a highly reactive chemical, in combination with the hydrocarbon produces a highly stable and unreactive chemical, with ideal properties for propellant usage. These propellants do not burn nor oxidize under normal conditions of everyday use, in fact they will not burn at all or propagate a flame.

They are highly resistant to attack by water. The rate of reaction with water decreases in the order of 113, 11, 12, 114 and 22, when these propellants are tested individually in contact with steel. However, they are somewhat less stable in the presence of alkaline water systems. Propellants containing hydrogen, such as 33, are slightly less stable to alkali than the others. The fluorine propellants are usable in all metal containers with the exception of high magnesium content aluminum alloys. The natural and synthetic rubber-like compounds vary in their stability when used as gaskets or seals in the propellant systems. The synthetics perform much better than do natural rubber products.

(*Continued on Page 64*)



FOAM AEROSOL



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AEROSOLS in review

A New Method of Fighting Silicosis

A NEW "aerosol" method of fighting silicosis, a chronic miners' disease, is described in *The Bulletin*, English-language periodical published in West Germany, in its issue for July 9. The process is described as follows:

"In the Ruhr area, where the 'aerosol method' was first tried out in 1951, many pits have now been equipped with inhalation facilities located at designated points where the miners can fill their lungs with a finely sprayed saline solution twice a day. Constant medical supervision has shown that even miners already victims of silicosis show marked improvement after a few inhalations of this kind.

"At the same time aerosols are being used to make the air in the pits cooler and easier to breathe. The goal is to find a solution which, when sprayed, would bind all dust particles, making their inhalation harmless. In connection with measures to prevent or diminish dust in the air of mines, and together with dust-filtering masks, the aerosol method, it is hoped, will make a significant contribution towards checking silicosis."

A DISCUSSION of pharmaceutical aerosols, included among the subjects covered in the June "European Aerosol Survey," a quarterly published by Druk-Pak, Ltd., Zurich, claims that the aerosol method is probably "the most convenient and effective for administering correctional and preventative allopathic medicines." "In aerosol therapy," the quarterly continues, "the remedy enters the blood stream along with the necessary oxygen contaminated by bodily secretions, but with forewarning to the organs involved."

"One of the principal research difficulties is the necessity of making all original tests and experiments with animals, principally guinea pigs, although some rats and mice have been used. Masks have to be fitted and the animals held in stationary positions. Only by these devices can accurate and comparative measurements be made of inhalations and exhalations of the administered remedies. Dissection must follow immediately after each prescribed duration test and the various organs analyzed for concentration and retention of the administered substance. . . .

. . . "One difficulty with using animals is the inability to control or regulate the breathing. With humans, it has been found that much depends on whether the breathing is shallow or deep, whether the breath is retained after a certain number of inhalations, and what kind of breathing cycle is maintained. Experiments in this area are, of course, impossible to make with animals. Most patients in aerosol therapy clinics are first given breathing exercises and taught breathing techniques, for it has been found that very few humans really know how to breathe correctly."

The report describes in detail the four pharmaceutical aerosols currently being manufacturered by Riker Laboratories, Los Angeles ("Medihaler-Phen"—for nasal inflammation and hay fever, "Medihaler-Epi"—for bronchial asthma, "Medihaler-Iso"—for asthma, and "Medihaler-Nitro"—for attacks of angina pectoris) and reports that a number of other pharmaceutical houses are experimenting with similar applications of their own product lines.

The survey calls the metering valve "the key to the problem." "With pressure filling, the accuracy of the propellant charge can be controlled within a fraction of a gram. On the product side, if there is any question about accuracy, the medicines can be first filled into a dissolvable capsule which is placed in the container before the valve is closed and the propellant charged. This method of capsule filling could be extremely useful for foreign licensees of pharmaceutical houses, who could then be assured of original materials and do their own local loading, labelling, etc. especially if there are unusual compositions and concentrations of aerosol applications."

THE same issue of the "European Review" carries probably the most comprehensive report published to date on the aerosol situation in the Iron Curtain countries. East Germany is reported to have had a 1956 production of about one million containers, according to the head of the country's principal loading station near Dresden. The station is equipped with a self-made cold line, premixing product and propellant for a single phase fill. "Containers are of tinplate with a few in uncoated glass. Valves are of the screw-cap type with conventional plastic spray heads."

"Apparently, there are now three types of products on the market; insecticide, air freshener, and an eau de cologne, the latter making its appearance late in 1956 in a glass bottle. The propellant is the usual fluorinated hydrocarbon from the Leuna-Werke, near Dresden, which was a part of the old I. G. Farben combine and has a capacity more than adequate for the East's customary refrigerant demand.

The leading station director, a young, intelligent East German engineer, wants to expand production and increase the product line with pressure filling equipment. He sees a ready market for at least five million containers per year, most of it exported to Russia and the other satellites."

The quarterly also reports inquiries for loading equipment from government purchasing organizations in both Czechoslovakia and Yugoslavia. "When it reaches this government level, the matter commences to be serious, and it is entirely possible that some equipment might be purchased at any time within 12 to 24 months after the submission of a quotation."

A SUGGESTION for an "antibacterial hair spray" is included in the Compounder's Corner of *Drug & Cosmetic Industry* for July. The author suggests the inclusion of 0.1 per cent or less of hexachlorophene, bithionol, TMTD, or another compatible antibacterial agent in aerosol hair setting formulas, pointing out that such an addition "should certainly have some deodorant value for hair, preventing the bacterial decomposition of perspiration from the scalp and development of perspiration odor." It is also mentioned that the antibacterial action "might even be useful in retarding the development of dandruff."

A GENERAL tendency to use better perfumes in insecticides in the United Kingdom and Europe is noted by Jack Pickthall in his monthly "Aeroscripts" (in the *American Perfumer and Aromatics* for the month of July). He points out that certain manufacturers are placing such emphasis on the odor of their insecticides that they are tending to add air-freshening properties to their advertising claims.

Mr. Pickthall, who recently set off a controversy on glass aerosols with an article pointing to the dangers of uncoated glass, declares that one of the principal factors holding back further cosmetic development in the U.K. is the manufacturer's insistence that his pressurized container deliver the emulsion in precisely the same form as he sells it in a non-aerosol package.

The English chemist, on the question of the spraying of emulsions, points out that it is often desirable that water be included in a cosmetic (for formulation reasons as well as the cost consideration). "One can, of course, dispense water as a spray by the 'three-phase' system, but this method has several disadvantages. In point of fact, one of its main economic advantages, low propellant content, contributes to these disadvantages. In these systems the propellant simply forces the water through the valve orifice so that, on entering the air, there is no propellant available to continue and enhance the degree of atomization. In effect, the kinetic energy is supplied by the head gas, and the fineness of the drop and distance thrown will depend to a large extent on the design and efficiency of the valve."

"It is doubtful whether a really fine and efficient spray can be obtained by this system and the 'dripping' effect due to unequal particle size is well known. One step further brings us to the possibility of solubilizing the propellant in the aqueous portion. I refer here not to cosolvents such as alcohol, but to surface-active agents. The systems of this type, so far in use, employ small amounts of propellant and operate at low pressures; and once again the spray is coarse. Although many types of solubilizing agents can be used, the nonionics are preferred."

In this column aerosol subjects, appearing in other domestic and foreign periodicals, will be reviewed and their findings summarized. It is felt that this service will enable the reader to keep abreast of most of the important contemporary articles about the industry, even though they may appear in other periodicals. Since there is a chance that some pertinent articles may be overlooked, it will be helpful if readers will call our attention to any they judge important enough to review.
The Editor

AN AEROSOL method of treating cystic fibrosis (described in *Time* magazine for August 5) was developed recently by Dr. Robert Denton, of the National Cystic Fibrosis Research Foundation. The article points out that Dr. Denton's treatment is merely a helpful treatment, since there is no specific cure for the disease yet known to medicine.

"For a limited number of cases Dr. Denton's pressure breathing apparatus is an additional safeguard (to close dietary supervision and extensive use of antibiotics.) An oxygen cylinder, hooked up to an aerosol bottle and a mask, forces air into the child's lungs under pressure so that it reaches corners hitherto closed, and increases breathing efficiency. The trouble is that even selected patients should have the treatment at least twice a day, which means laborious visits to clinics, or training a parent in the operation of tricky (and expensive) apparatus. Says Dr. Denton: 'It may be just as dangerous as it is valuable'."

A DISCUSSION of pyrethrum, together with an outline of the history of both the flower and insecticide, was featured in *The London Times British Colonies Review* for the fourth quarter of last year. The article says that, in East Africa alone, nearly 700 farmers are growing pyrethrum on more than 20,000 acres of land, and that the rise of world living standards has considerably increased the demand for the product.

Three British laboratories, the Scott Agricultural Laboratories in Nairobi, the Rothamstead Experimental Station, and the Colonial Products Laboratory in London are credited with much foresight and a major share in the promotion of Kenya pyrethrum as an insecticide raw material.

The article gives, as a capsule history of the African pyrethrum industry, the following paragraph:

"More than 16 years ago the Mitchell Cotts Group was appointed overseas agents to the pyrethrum

(*Continued on Page* 79)

Aerosols in South America

a special report on the industry's current status, shortcomings, and future

by Frederick G. Lodes
President
Lodes Aerosol Consultants Inc.

I HAVE just returned from a rather extensive trip to South America, the purpose of which was to study the status of Aerosols in the South American countries today as well as to forecast future potentials. To fully evaluate this market, I investigated availability of the component parts, such as: containers, propellants, valves, filling facilities, raw materials, etc., and also attempted to study the reception of the consumer in general to the Aerosol principle. The study covered a most important phase as to what is necessary in each country to make completed Aerosol units available for the consumers of that particular country.

In visiting the larger cities, the progressive approach to new methods, the standard of living, and the consumer thinking would certainly invite new packaging techniques. We here often forget the population of South American countries and sometimes dismiss future potentials because of buying power. It is surprising to think that in the countries visited, the population approaches one hundred million people, and although the buying power percentage wise is not comparable to the United States, nevertheless, it is sufficiently high to assure a very satisfactory market.

Generally speaking, I was both satisfied and elated with the general reception to the idea of marketing an aerosol, and likewise found that the consumer was enthusiastic. Although my study did not cover all countries of South America and all cross sections of the countries I visited, I believe the results were sufficiently conclusive to establish that there is a definite Aerosol market awaiting merchandisers in South America.

In the earlier years of our industry there was a hesitancy on the part of certain reputable manufacturers to embark on a program which would represent a radical departure from previous methods. This reaction was not common to our friends to the South. Without exception, the Aerosol is well-known, enthusiastically received, and extremely interesting to all the large, reputable marketers contacted. Unquestionably, the progress made in our expanding industry in the United States in the last five years has contributed greatly to this feeling. The Aerosol is no longer considered a gadget or a gimmick. Despite the enthusiasm of manufacturers and marketers alike, the Aerosol has been retarded to date in South America by the same vital factors which were lacking in many other countries in the early stages. It was of prime importance in this study to establish what has to be done, what can be done, and how soon it can be done to the satisfaction of the firms that will eventually be the big names in the South American Aerosol industry.

Extensive Aerosol advertising, education and promotion have not taken place as yet because the Aerosol product as we know it with regard to costs, quality, and manufacturing skills is not yet available in these countries. Certain raw materials and manufacturing costs are comparatively high because of low volume and lack of specific technical skills.

This is reflected in the selling prices of the comparatively few Aerosols that are domestically manufactured and retailed. In reviewing the retail prices of Aerosols, it was found, for example, that in Brazil an 11 oz. insecticide retails for $1.40; a popular brand 6 oz. shave cream for $1.70; a small container of hair lacquer for $2.30, and a 6 oz. hair lacquer made in the States retails for $3.50. In Venezuela, where importation from the States is possible, although the duty on certain classes of products makes it expensive, it was found that the majority of Aerosols appearing on the shelves in Caracas were of U. S. manufacture. The retail prices of Aerosols in Venezuela were about as follows: insecticides, 12 oz., $1.25; room deodorant, 6 oz., $.98; shave cream, 6 oz., $1.25; hair lacquer, 6 oz., $1.55.

These relatively high retail prices reflect the import duties which vary appreciably, from insecticides to luxury items (cosmetics). It has been found that an important factor in Aerosol volume is retail price, and in order to satisfy the mass market, the basic costs must be reduced to a satisfactory level.

Many of the leading marketers of Aerosol products were contacted, a good number of whom are currently marketing Aerosol products in the States, and without exception, they were enthusiastic about their particular South American market. Before these Aerosol merchandisers can roll safely and comfortably, the product must be made locally, in most cases, with the best possible technical skill and quality. Aerosol fillers, container manufacturers, valve manufacturers, raw material suppliers of all types, etc., were contacted in an effort to make available in the various countries, the necessary component parts in the shortest possible time. The writer firmly believes that 1958 will see the bringing together of these various efforts into one unified program, and Aerosol production will be in full swing in the various South American countries.★

$1.50 VALUE
7 FULL OZS.
SPECIAL
Nestle
SPRAZE
FOR FIRM LASTING SETS
LANOLIN
1

KRYLON
BATTERY
PROTECTOR
2

MIST FRAGRANCE
OF
Lady
Lavender
SPRAY
PINE
SPRAY
CLEAN and
FRESH
DELIGHTFULLY
FRAGRANT
3

NON-
TOXIC
airkem
AEROSOL
INSECTICIDE
odor controlled
4

New Products and Packages

1. **SPRAZE and SOFT SPRAZE,** both products of Nestle-LeMur Co., New York, are being marketed nationally in two new sizes — the seven-ounce (shown in photo) and four-ounce. They replace the six and three-ounce containers and will sell for the same prices. Cans are being made by American Can Co.

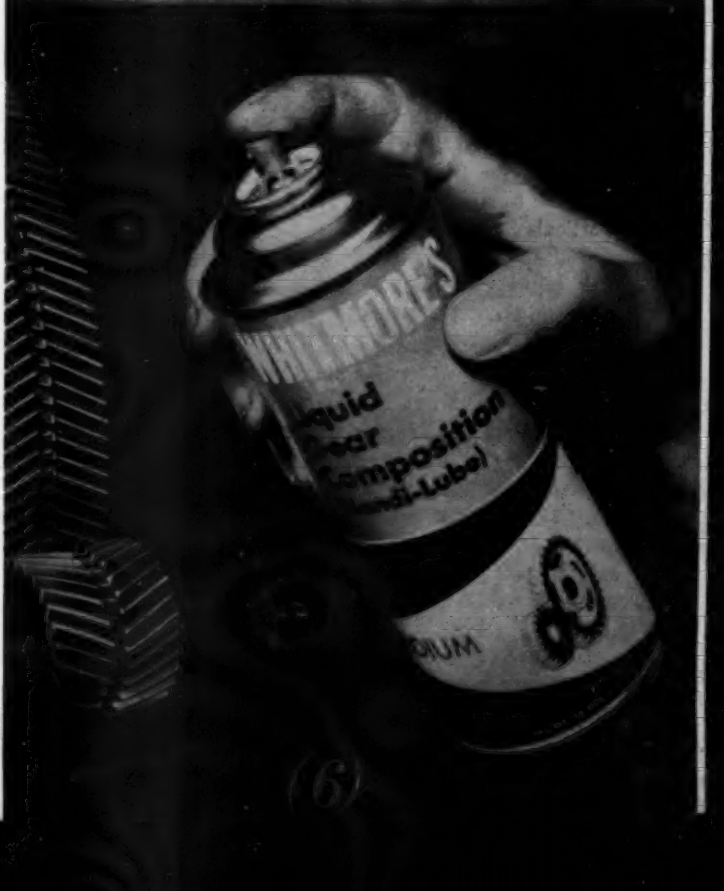
2. **BATTERY TERMINAL COATING PROTECTOR SPRAY** is a new product of Krylon, Inc., Norristown, Pa., to help protect storage batteries against current leakage, acids, and corrosion. Krylon is marketing the product through hardware, automotive, and marine outlets, with a retail price of $1.95 for the 16-ounce size and 98 cents for the six-ounce size.

3. Three new fragrant sprays, **LADY LAVENDER, PINE,** and **CEDAR** scents are being marketed nationally by Krylon, Inc., for the producers, Robinco, Inc. In a six-ounce container, the sprays are being retailed at 98 cents.

4. **AIRKEM** aerosol insecticide, in a new eight-ounce container, is being produced by Airkem, Inc. for the institutional market. Previously only in 12 and 16-ounce cans, the spray, packed in Canco containers, will be distributed nationally through institutional suppliers.

5. **ESCAPADE** and **DESERT FLOWER,** both packaged by Fluid Chemical Co. for Shulton, Inc., Clifton, N.J., are being offered in paired containers—one a 3½-ounce dressing table bottle in plastic-coated glass and the second a ¼-ounce purse size spray flacon for perfume.

6. **HANDI-LUBE LIQUID GEAR COMPOSITION,** in a 16-ounce container for lubrication of open gears and sliding surfaces, is a new addition to the product line of The Whitmore Mfg. Co., Cleveland. It is available in "light", "medium" and "heavy", and is non-toxic.



Pressure Packaging Overseas

Dr. Tom C. Clark, Druk-Pak, Ltd., Zurich,
reports on some general effects to the European aerosol industry of reduced trade restrictions in the European Common Market.

THE "Visiting Fireman" season is now in full swing, and we in Switzerland are happy to report getting a fair share. Americans in Europe seem more numerous this summer than usual, as well as more subdued, soberer, and changed in their attitude towards Europe. Whether this is due to an U. S. educational campaign in foreign relations, a new maturity, the President's "good-will-ambassador-letters" to new passport holders or other factors, there is a definite change for the better. Europe is changing, too. In the past, U. S. visitors looked mostly for Europe's quaint and unusual — gaped at old buildings-and peculiar customs. Now, they find more and more progress — the same as in America — even down to and including aerosols.

Particularly striking is how the new visitors look on Europe as not merely a place to visit, have a rest and see things, but as a place to live and work. Basically, we have found little difference between working in the U. S. and working in Europe, since both economies are now both highly industrialized (except, perhaps, for France) and in both the industrial plant is in high gear. Expansion plans are in evidence everywhere, capital is available, the market is broadening, basic and raw materials are in abundant supply and labor is reasonable in cost and efficient. Compounding these ingredients spells prosperity, the broth for good management. In addition, the tax situation is more favorable in most countries (except, perhaps, the U.K.) and the capital gains tax not yet in effect. This allows the adventurer to keep what he makes, or at least try to. We would like to see more and more Americans in European business.

As to living conditions, both sides of the ocean have their draw-backs. Because of the full industrial employment, there are the same difficulties in Europe as in the U. S. with things like minor repairs and getting mechanics to undertake (and then finish) small jobs. In fact, "do it yourself" will probably shortly become just as popular and just as necessary in Europe as it is in the U. S. On the other hand, the working pace in Europe — and consequently also its pace for living — is more leisurely and pleasant. Europe has just as much intensity and one works every bit as hard, if not a little more so, than in the U. S. It is the relaxation which makes the difference. In living, the European does not have such a constant stream of new things with which to keep up, and he has more privacy. When he takes a rest or enjoys a holiday, he leaves all kinds of competition behind. He does not necessarily want to catch the biggest fish, shoot the lowest golf score, or win the most games of tennis. Competition, he feels, belongs in the market place, not in the home or on a holiday.

ON THE business and industrial side, there is no doubt that the Marshall Plan, more than any other factor, saved Europe economically. It cost a lot of money, much waste was committed in its name, it may have lasted too long, and in certain sections it continues unnecessarily in effect. But while its execution left much to be desired in certain fundamental respects it accomplished its principal goal and did, indeed, save Europe. Its success created for Europe some new problems (or rather revived some of Europe's old ones) which the Europeans are now in the way of solving in their own unique way. We refer especially to European unification.

While we have some trouble in understanding and living with the French, it must be remembered that post-war plans and movements toward European economic unification are all basically French in origin. The Schumann Plan was French, the European Defense Community (which the French parliament later knifed) was French and now the European Common Market and Euratom, both French ideas and principally the work of one man, Jean Monnet. The Schumann Plan covers the coal, iron-ore and iron and steel industries in a

HOW YOU CAN

PACKAGE FOR PROFIT

IN 1957

In the Pharmaceutical Market...

growth aerosols point the way to volume sales

For packaging drugs and pharmaceuticals the aerosol offers some outstanding advantages: The sealed container prevents contamination of ingredients, spilling is eliminated, and rapid uniform application of medicament is possible. In addition, a fine mist can be readily formed for inhalation purposes.

Aerosol pharmaceuticals have a really bright potential for future growth. Production has grown steadily to over two and a quarter million units in 1956, and the growth rate today is such that about four and a half million units are predicted for 1957.

Du Pont's consumer survey covering burn preparations, antiseptics and bandages showed a large total market for these pharmaceutical products in all forms of packaging, but a striking lack of awareness of the aerosol. Yet where housewives *had* tried these pharmaceuticals in aerosol form, they indicated a definite preference for the aerosol method of application. Why not package your pharmaceutical product for profit in an aerosol?

Send for your free copy of Du Pont's survey report on the market for aerosol pharmaceuticals. Write E. I. du Pont de Nemours & Co. (Inc.), "Freon" Products Division 239, Wilmington 98, Delaware.

About fifty pharmaceutical items packaged in aerosol containers are now on the market, and several more are in the development stage. These include such products as inhalants for asthma relief, burn sprays, poison-ivy sprays, and antiseptics, anesthetics and antibiotics for topical applications.

For help when you package for profit call in a custom aerosol filler

You can get help in planning for your aerosol product, and you don't need experience or expensive equipment. Just call on a custom filler. He can help in many ways—product evaluation, formulation, testing, container selection and labeling, filling, packing and shipping. When you select a filler, be sure he uses Du Pont Freon* propellents for your product. With "Freon" you get a propellent backed by the industry's most comprehensive technical and marketing services and more than 26 years of Du Pont manufacturing leadership. For names of qualified fillers near you, write to E. I. du Pont de Nemours & Co. (Inc.), FREON® Products Division 239, Wilmington 98, Delaware.

**Freon and combinations of Freon- or F- with numerals are Du Pont's registered trademarks for its fluorinated hydrocarbon propellents.*

FREON® *propellents*

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BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

European six-nation community (France, Germany, Italy, Belgium, Holland, and Luxemburg). It has been in effect and successfully operated since the summer of 1953—four years. Under the Treaty, the products of these industries move freely without customs duties, quotas, or restrictions of any kind from one country to the other and a tariff wall common to them all protects them from the outside. Thus, tin-plate manufactured in France can be shipped to Germany to make aerosol cans without any duty or extra charges to the German purchaser. In the same fashion, a Dutch stamper can buy German tinplate for making valve mounting cups. But the treaty covers only raw materials and finished products of these industries, and there the story ends. For example, when the German can maker tries to ship the aerosol cans made from French tin-plate back to a French aerosol loader, he finds it impossible due to French duties and quota restrictions. With the aluminum aerosol can, the Italian slug maker cannot ship his cheaper aluminum slugs into Germany because German duties on aluminum make the delivered price too high and the treaty does not cover aluminum, only iron and steel products. Similarly, with the chemicals as well as the finished loaded containers. Now, this problem is on the road to solution with the European Common Market.

Worked out principally by bureaucrats and international political committees, the treaty covering the European Common Market is a rather complicated affair. However, it still has enough of Monnet's resolute French logic to make it workable and successful. It is now past the French parliament (the graveyard for the previous plans) and has also been approved by Germany and Italy, with ratification by the others a foregone conclusion. The basic features of the plan are as follows:—

(1) *Custom Duties, Quotas, Import and Export Restrictions, etc.*—On all industrial products without exception (agricultural and dairy products are still being debated), these are to be completely removed within a maximum of 15 years. Dependent on progress and developing conditions, this time may be cut down to 12 or even 10 years and on some products, still less. The duties are to be successively reduced at stated intervals by fixed percentages. Thus, within 18 months after the Treaty goes into effect, the first reduction of 10% takes place. Others follow regularly thereafter until they are wiped out completely.

(2) *The Common Market is open to any European Country which wants to join.*—The Plan was originally conceived for the six partners in the Schumann Plan — Coal and Steel Community, but has now caught on with the other European countries, including the British. Here, for once, it is the British who have the problem, not the French.

Membership in the plan involves acceptance of the Community's tariff wall frontier against non-member countries. In other words, if a European nation does not join "the club," its goods and wares must pay a duty to get into a member's market. Also, there are no preferences. The same rate of duty is applied at the borders of each member nation against non-member nations. This is the stumbling block for the British as well as for some of the Scandinavian countries.

Under the British tariff system — and they have heavy tariffs — there are two kinds of rates: preference rates for the Commonwealth countries and normal rates for all other outsiders. Thus, Canadian automobiles come in at a much lower rate than German or U. S. automobiles. Similarly, the Commonwealth countries give preferences on British produced goods. Australia, for example may have only a 5% duty on British-made aerosol containers, but that duty may be 25% on Italian containers.

To accommodate the British problem (which is a real one) it has been suggested that a special associate membership be created which would permit the associates to fix and regulate their own external tariff walls against non-member countries but have no tariffs at all against member countries. Thus, the British might set up a tariff of 10% against Canadian autos, 25% against those from the U. S., but German and French autos would come in duty-free the same as British autos would enter France and Germany. At the same time, the full members might have a 30% tariff on autos against the non-member world. But as is readily apparent, this can give rise to a whole series of problems. Exports from member countries to associate member countries, and vice-versa, would all have to be accompanied by some kind of certificate of origin to prevent diversion in transit and assure arrival and ultimate use at the proper destination. Otherwise, for example, Canadian cars shipped over England, an associate member, might come into member countries cheaper than on direct import.

When fully realized, the European Common Market would have a buying population larger than the U. S. and an economic-industrial system which should operate on the same basic principles as exist in the U. S. But a host of other problems remain to be worked out and experimented with. Some of them are: currency controls or the free exchange of currencies, labor and its mobility, capital and its investment, transport rates between and among participating nations over state-owned means, etc. However, the political aspects have taken a back-seat and practical heads are running the show. Hence, the 10 to 15 years for full inauguration. Incidentally, there is a probability that, if successful, the European Common Market could result in a thriving buffer zone between the U.S. and Russia.

This plan is so revolutionary and all-comprehensive that we can touch here only on some of its broader features. In our next column, we will try to bring it down specifically to our European aerosol industry and show what it may mean in the way of components and finished products for aerosol packaging to members and non-members alike.★

NEWS of Pressure Packaging

VCA Elects Was, Small VP's

The Valve Corp. of America, Inc., Bridgeport, at the annual meeting of the board of directors, elected Sig-

Sigmud Was

mund Was and David Small vice-presidents of the firm. Miss Florence Artell was elected to the office of assistant secretary.

Mr. Was has been sales manager for VCA for the past four years, and is manager of the company's New York office at 10 East 49th Street. Mr. Small, a Connecticut businessman (who was also elected to the board of directors) replaces Marvin Bruner, a vice-president and board member, who resigned.

In his report to the directors, Philip H. Sagarin, VCA president, told of the many advancements made by the company, including the addition of increased floor space and the installation of new equipment to step up production and development of new valves.

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Stepan Acquires Ninol Labs

The Stepan Chemical Co., Chicago, last month concluded negotiations for the acquisition of Ninol Laboratories, Inc., also in Chicago, and the properties in which it conducts its business, for approximately $2 million. Both firms produce surface active chemicals, and the acquisition is expected to increase the annual sales of Stepan to about $16 million.

Ninol will operate as a division of Stepan, with Ninol's president, Jerome Kritchevsky, joining Stepan as a vice-president and general manager of the Ninol Division. Other Ninol officers will continue in similar posts in the new Stepan division.

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Aluminum Costs Rise

Aluminum Co. of America, largest aluminum producer in the nation, announced recently it would raise the price of primary aluminum one cent a pound. A similar price rise, which had been expected to coincide with labor cost increases going into effect on Aug. 1 under industry-wide contracts, is expected to be announced by other major producers. The price change is the first for pig aluminum since last August.

Risdon Initiates Patent Suit

The Risdon Manufacturing Co., Naugatuck, Conn. recently filed suit against V.C.A., Inc., Bridgeport, in the U.S. District Court in Connecticut. Risdon charged infringement by V.C.A. of Risdon's "Micro-Mist" spray nozzle patent No. 2,767,023.

When queried about the suit, Phil Sagarin, V.C.A. president, declared: "It has never been the intention of V.C.A., now or ever, to infringe on anyone's valid patent, because V.C.A. would expect all its own patents to be respected."

"With regard to the Risdon patent on mechanical break-up button, V.C.A. has made a very thorough patent search and in no way believes it is infringing. It is for this reason that V.C.A. is holding all its customers harmless and is certain that, if the matter ever goes to court, the decision will be in V.C.A.'s favor."

Fairfield Develops Stainless Pyrethrum Compound

DEVELOPMENT of improved Pyrenone concentrates which provide a base for completely stainless insecticides, has been announced by the Fairfield Chemical Division of Food Machinery and Chemical Corp., New York. The advantage of a stainless insecticide for use in the home, in food handling and food storage, and other areas where staining from insecticides has been a problem, is obvious.

Pyrenone-type insecticides, which have had wide acceptance domestically and abroad, combine pyrethrins (obtained from extracts of imported pyrethrum flowers) and piperonyl butoxide (a synthetic organic chemical developed by the Fairfield research laboratories).

Pyrethrum, the oldest and perhaps most versatile of all insecticide materials, unfortunately has an inherent yellowish cast which under normal extraction processes persists in finished insecticides. Now, according to John A. Rodda, manager of the Fairfield Division, this new production process not only provides the stainless feature; but, of equal importance to formulators, is said to maintain the full value of the pyrethrins and assures a high order of stability.

These improved, non-staining Pyrenone concentrates will be offered to the trade at no increase in price.

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Fortescue Joins Ungerer

Ungerer & Co., Inc., New York, recently announced the appointment of Joseph L. Fortescue as manager of the Philadelphia office, in charge of sales and customer service in that territory. He is well known to the trade in the Philadelphia area, where he has had over 30 years experience in the fields of essential oils and aromatic chemicals. Mr. Fortescue will be located at the Ungerer Philadelphia office in the Bourse Building, 5th and Market Streets.

Continental Names Thonet

The Continental Filling Corp., Danville, Ill., has announced the appointment of Theodore A. Thonet to its laboratory research staff. He holds a B.Sc. degree from the University of Miami, with extensive experience in analytical and physical chemistry. He will be engaged in aerosol research, under the direction of William Walker, the company's research director.

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Bid to Buy J. B. Williams

Pharmaceuticals, Inc., maker of "Serutan," has made a bid to take over control of the 117-year-old J. B. Williams Co., Glastonbury, Conn., a leading aerosol shave cream marketer. The bid was in the form of a cash offer to Williams stockholders of $9 per share for common stock and $18.50 per preferred share.

According to Charles T. Lipscomb, Jr., Pharmaceuticals president, the move has the support of the Williams management, and under present plans J. B. Williams would be operated as a wholly owned subsidiary under the present management. Mr. Lipscomb declared that his firm "has some wonderful advertising properties which would assist in promoting Williams products." Some product changes are contemplated.

According to present stock values and Williams debentures, it has been estimated that the transaction will cost Pharmaceuticals something in the vicinity of $5.4 million.

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Krylon Names Sales Reps

Several appointments of new sales representatives for Krylon, Inc., world's largest manufacturer of spray protective coatings and spray enamels, have been announced from the company's headquarters at Norristown, Pa.

The new appointments, effective July 1, are as follows: The W. W. Campbell Co., 30813 West Lake Road, Bay Village, Ohio, who will cover the state of Ohio; The Munger Co., 215 North Riverside Ave., St. Clair, Michigan, for the state of Michigan; Joseph Parker and Associates, 1810 West End Avenue, Nashville, Tennessee, for the states of Kentucky, Tennessee, and Mississippi. Richard A. Ruhling and Associates, 1436-A Merchandise Mart, Chicago 54, Illinois, presently Krylon sales representative in Illinois and Wisconsin, has been assigned the state of Indiana.

These newly appointed sales agencies will represent Krylon in the hardware, paint, housewares, art and office supply trades.

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Chemway Forms Intl. Unit

The Chemway Corp., New Brunswick, N. J., recently announced the formation of an international division, in a major expansion of its overseas operations. The company, a producer of cosmetics, medicines, insecticides, and allied products, last year recorded overseas sales of more than $2 million.

To head the new unit, Chemway named as vice-president and general manager Eugene Anschel, who had been manager of international activities for the Nepera Chemical Company, now a subsidiary of Warner - Lambert Pharmaceutical. Socorro Paniagua was advanced by Chemway from export sales manager to general sales manager for the new division.

New Product Line Announced

Miss Hazel Bishop, one of the founders of Hazel Bishop, Inc., recently announced the formation of a new corporation to manufacture three new foot products. Miss Bishop, who is no longer connected with the firm bearing her name, says that the new firm, the H.G.B. Corp., will manufacture two aerosol products and one in a polyethylene squeeze bottle.

The aerosol products are "Wingfoot Powder" (in a 6-ounce container retailing at $1.75) and "Wingfoot Spray Cool" (in the same size retailing at $1.50). The first of these is a new form of spray powder designed to relieve itching, burning feet. It contains a bacteriostic agent to help cure and prevent fungus growth, infection, and athlete's foot. "Spray Cool" is a spray to "give buoyancy and new life" to burning, aching feet when sprayed over the stockings.

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Hagler in Civic Post

H. Bruce Hagler, president of Associated Brands, Inc., Brooklyn, New York, was recently named to the board of trustees of the Jewish Hospital of Brooklyn. He has been active in Brooklyn civic and philanthropic activities for over 20 years.

CSMA Names Two New Aerosol Liaison Committees

THE Chemical Specialties Manufacturers Association recently named two important new committees, one a "Liaison Committee on Food Aerosols" and the other a "Liaison Committee with Colleges and Universities Interested in Aerosol Information." Both are expected to perform important functions in expanding fields of aerosol activities.

Heading the food aerosols committee will be R. C. Webster, Western Filling Co., with W. E. Graham, Crown Cork & Seal's Can Division, as vice-chairman. Members will include Hugh Burgess, Stalfort Pressure-Pak; George Fuld, Fuld Bros., Inc.; P. B. Gottschall, Continental Can Co.; E. J. McKernan, Seaquist Mfg. Co.; Dr. Francis Mina, Lodes Aerosols Consultants, Inc.; H. E. Peterson, Peterson Filling & Packaging Co.; and Dr. E. G. Young, DuPont "Freon" Products Division.

Dr. Francis Mina was named chairman of the Liaison Committee for Colleges and Universities, with H. R. Shepherd, Aerosol Techniques, Inc., as vice-chairman. Filling out the committee are G. Barr, G. Barr & Co.; C. E. Beach, John C. Stalfort & Sons Inc.; F. W. Blodgett, DuPont "Freon" Products Division; R. J. Kraus, Stalfort Pressure-Pak; and R. W. Svendsen, Chase Products Co.

In the same bulletin, the CSMA added Milton H. Schwartz, Revlon, Inc., to the Scientific Committee; Daniel C. Geary, also of Revlon, to the Glass & Plastic Container Advisory Subcommittee; and Edward Kearns, John H. Breck, Inc., to the Personal Products Standard Methods Subcommittee.

Titan Readies Aerosol Production Line

TITAN Chemical Industries, Inc., Colorado Springs, Colo., last month announced that it has completed the move to its new plant and will begin aerosol production Sept. 3. The company's product line will include hair sprays, shave cream, room fresheners, and other products. Current plans call for consumer distribution over the entire Rocky Mountain region this fall, followed by nationwide coverage early in 1958.

Titan's new plant at Colorado Springs, Colo., with the Rockies in the background.

Titan was incorporated last Dec. 14 under the leadership of Everett Cole, president; Joseph D. Park, vice-president; and Paul L. Barrick, secretary-treasurer. Managing the Aerosol Division at Colorado Springs is Martin M. Reynolds, formerly of the Linde Air Products Co. Division of Union Carbide Corp. Prior to his association with Linde, where he was in charge of nitrogen sales development, Mr. Reynolds had been affiliated with the National Bureau of Standards, West Chemicals, Inc., the Sugar Research Foundation, and Wyandotte Chemical Co.

Assisting Mr. Reynolds and serving as chief chemist is Raymond J. Seffl, who holds a doctorate from the University of Colorado. Prior to his present appointment, Dr. Seffl was associated with M. W. Kellogg Co., Jersey City, N. J.

The purchase of an almost-new, modern building, tailored closely to the company's exact specifications and available for immediate occupancy, is said to have advanced areosol production date at least a year, and relieved the firm of the necessity of building a new plant.

The plant's initial equipment consists of two Mojonnier filling lines, capable of pressure and/or cold filling. The total capacity of these lines is estimated at 28,800 units each eight-hour shift. The size of the building will permit installation of additional equipment without enlargement of the present plant.

Titan's Colorado Springs facilities consist of the main brick building with 22,000 square feet of productive factory space and a warehouse building of 6,000 square feet. In addition, in the main building there are maintenance shops, a large power plant containing air compressors and boiler, employee's cafeteria, and 8,000 square feet of office and laboratory space.

The buildings and parking lots occupy five acres, and adjoining this acreage is an additional ten acres of level land also owned by Titan and held in reserve for future plant expansion. The property is served by a Rock Island Railroad spur line.

Titan will maintain its executive offices at 401 East Filmore, Colorado Springs, and its sales office at Room 594, Hotel Albany, Denver.

New Survey Reports Aerosol Dollar Volume Up

AEROSOL dollar volumes in nearly all product categories listed continue to surpass previous years' totals, reported the *Drug Trade News* last month in its special "Tenth Annual Survey of What Customers Spent for All Products Sold in Drug Stores". The survey covered all the leading products sold in drug stores during 1956, including five leading aerosol categories.

As was expected, spray hair fixatives led all other aerosol products in the survey, with a total of $75,050,000 sold in 1956 through all civilian outlets. Drug stores accounted for exactly 50% of the total, or $37,570,000. In 1955 the total outlet sales amounted to $49,490,000, with drug stores accounting for $27 million, 55% of the total.

Shaving creams packaged in pressurized containers enjoyed total sales of $30,800,000, $13,440,000 of which were sold in drug stores. This was $4.5 million over the 1955 figure, and in both years drug stores sold 44% of the total.

Aerosol colognes showed surprising gains in dollar volume. They racked up total sales figures of $24,630,000, an increase of $7.2 million over 1955. Drug stores accounted for 8.9 million, or 36% of this figure, duplicating their percentage of the 1955 sales.

Household deodorizers enjoyed a slight sales advantage over the previous year, the total of $26,790,000 slightly surpassing the 1955 figure of $23,160,000. Drug stores accounted for 12% of both figures.

The only aerosol product category to show a dollar loss was insecticides, which slumped from $59,200,000 in 1955 to $56,120,000 last year. The percentage sold in drug stores was also off in 1956, falling from 22 to 20% of the total.

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Nestle-LeMur Sales On Rise

Rising sales figures are expected to boost Nestle-LeMur's 1957 sales to somewhere between $9 and $9.5 million, Louis Naidech, executive vice-president of the New York company, told the New York Society of Security Analysts last month. He reported that earnings of 90 cents to $1 a share for this year are "a real possibility".

Mr. Naidech predicted an even better year in 1958, basing his prediction on "the rate of our growth and that of our industry". Nestle-LeMur markets a complete line of aerosol cosmetic products, concentrating mainly on hair products.

He reported that the company is interested in further expansion by acquisition, "preferably by cash so as not to dilute equity and to maintain our stock leverage".

Aerosol growth has been both rapid and satisfying, but nevertheless the result of well-planned, exacting design. Valuable time can be gained through a proper program approach. Whether your Aerosol problem be technical, promotion, diversification or sales, we believe qualified advice and guidance will prove most beneficial.

To assure success in this fast-growing, lucrative field, may we suggest that you investigate the services of a competent Aerosol staff.

Lodes Aerosol Consultants, Inc., offers the unique advantages of broad and basic Aerosol experience coupled with extensive pharmaceutical background.

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The Braznell Story

—— One Solution to the Problem of marketing an "Industrial-type" product

by Mildred Weiler

Aerosol Age St. Louis Correspondent

AFTER two years of successful marketing an aerosol product for the graphic arts field, the Braznell Co., of St. Louis, considers that it has "arrived" in the aerosol field.

Their product, called "Econ - O - Mist", is a pressurized spray designed to cut down on loss from skinned ink, and is believed to have been the first aerosol product of its kind to find use in the graphic arts industry. Printers and lithographers had seriously been forced to devote more "wash-up" time on the presses, with the advent of faster drying inks, and the Braznell Co. researchers decided that an aerosol non-skinning substance would effectively cope with the problem.

Since the company has been in the ink making field since 1926, its confidence in the advantages of the aerosol container sprang out of more than amateur interest in the problem. The researchers believed that by use of a handy pressurized can the printer could spray the rollers of his press to keep the ink from drying. Also, by spraying the ink containers at the end of each run and every night, losses from skinned ink would be greatly reduced, and the saving in wash-up time would be a worthwhile selling point for the product.

One of the biggest problems in the development of the product, was determination of sufficient gas pressure to enable the package to deliver the spray with sufficient penetration, and at the same time enable the company to put enough usable fluid into the container to satisfy the demands of a highly critical technical consumer public.

Continued laboratory research solved both problems, and Braznell very soon had the product ready for production. The product is currently being packaged by Plaze, Inc., St. Louis custom fillers, in a 12-ounce Crown can with an Aerosol Research valve, and retails at $2.

The second major problem (and the one that more properly bears telling here) was that of distribution: How to get a good aerosol product (that, once used, would be a hit) into the hands of prospective users.

The company's first tentative effort was a direct mailing, with an offer of a free sample if the prospect returned a special post card. According to Gerald Brazell, company secretary-treasurer, "The results of this campaign were amazing. After the free samples had been used, we received orders from all over the country, our product sold itself to others, and we turned to distributors for a steady outlet."

Today there are "Econ - O - Mist" distributors in most of the major cities of the U. S., South America, and Canada. In most cases the distributors are paper merchants, ink companies, roller companies, and other independent printing suppliers.

Through this distributor system sales of the product for the first six months of 1957 are 114% greater than for the same period last year, and they are still spiraling as distributorships are added in new cities.

(Continued on Page 78)

CSMA Lists Rules, Deadline Date for 1957 Aerosol Package Contest

TEN product categories were listed, and Oct. 15 has been designated as the closing date for entries, as the Chemical Specialties Manufacturers Association last month issued final details on its sixth annual aerosol package contest. As in previous contests, the awards, both for the product categories and "best of contest" package will be announced in conjunction with the association's annual meeting, to be held this year at the Hollywood Beach Hotel, Hollywood, Florida, Dec. 9-12.

The ten classes will include insecticides, repellents, and moth proofers; room deodorants; paints, enamels, other protective coatings, and paint remover; other household products; shave products; hair preparations; other personal products; medicinal and pharmaceutical products; industrial products; and glass and plastic aerosols (all products). Entry blanks and further information may be obtained by writing to the CSMA, 50 E. 41st Street, New York 17.

RULES OF THE BEST PACKAGE CONTEST:

1. All entries will be made in the name of the brand owner or marketer. The product must be on the market and have been freely offered for sale prior to September 1. Contract fillers are urged to enter packages for their customers. Be sure to enter vendor's name on form as required. Entries should be made only with permission of vendor and notifications of any awards will be sent to the vendor with the name of the individual furnished.
2. Entries will close October 15. All entries should be sent as soon after September 15 as possible to the Aerosol Awards Committee at this office, and should comprise one completely *assembled empty* container with attached tag showing (a) name and address of the brand owner; (b) class in which entry is made by number as noted above.
3. *Send one completed entry blank for each package entered when shipment is made.* Additional entry blanks will be sent promptly on request.
4. Only one entry may be made by any marketer or brand owner in any one class, but entries may be made in as many classes as desired by each.
5. Entries are open to *any aerosol brand owner or marketer,* anywhere and are *not* restricted to members of CSMA.
6. There are no entry fees or other charges to entrants.
7. All products shall be adequately labeled and in compliance with laws and regulations.
8. *Awards will be made on the basis of general sales appeal of the complete package.*
9. Packages cannot be returned. CSMA can assume no responsibility for the packages.
10. Upon receipt of each shipping carton, a post-card acknowledgement will be sent to the shipper. The contents of the shipping carton will not be checked until all packages are assembled for judging.
11. All packages entered will be re-shipped by CSMA to the hotel and will be on display at the 44th annual meeting in the Hollywood Beach Hotel, Hollywood, Florida.
12. The committee reserves the right to reclassify any entry prior to judging and to reject any entry it deems advisable.
13. Best packages will be selected in ten classes as noted above and a "best package in the show" will be chosen. Judging will be done by a group of qualified persons. Their decisions will be final. Announcement of winners and award of certificates will be made at the 44th annual CSMA meeting in Hollywood, Florida.
14. After the display at the 44th annual meeting, the packages will be disposed of by the Aerosol Division, Public Relations Agency.

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MM&R Appoints Nordbrock

Magnus, Mabee & Reynard, New York essential oils manufacturer, have announced the appointment of Edward E. Nordbrock as a sales representative in the company's Midwestern sales division. He will work out of the Chicago office under the direction of Arthur R. Jensen, MM&R divisional manager.

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New Aerosol Line in Fla.

The insecticide firm of Truly Nolen Products, Inc., Miami, Fla., purchased recently by Thomas F. Donofrio of Toledo, O., has announced that a modern aerosol loading line is being installed at the Miami plant. Patents on the aerosol machine are held by Aerosol Pak Corp., Toledo manufacturer and filler of aerosol products, which was acquired by Mr. Donofrio and his associates last year.

To be director of national sales of Truly Nolen, Mr. Donofrio announced the appointment of Lee R. Olmstead, formerly on the sales staff of Aerosol Pak Corp.

—Convention Calendar—

Chemical Specialties Manufacturers Association, General Luncheon,
Commodore Hotel, New York, N. Y. ..... Sept. 16, 1957

Society of Cosmetic Chemists, Chicago Chapter, annual seminar,
Chicago, Ill. ..... Sept. 19-20

American Drug Manufacturers Assn., Research & Development Section,
Westchester Country Club, Rye, N. Y. ..... Oct. 9-11

American Drug Manufacturers Assn., Production & Engineering Section,
Whittier Hotel, Detroit, Mich. ..... Oct. 24-25

National Paint, Varnish & Lacquer Assn., annual convention,
Sheraton Park and Shoreham Hotels, Washington, D. C. ..... Nov. 4-6

Manufacturing Chemists' Assn., 7th Semi-annual meeting and Winter Conference,
Statler Hotel, N. Y. ..... Nov. 26

Toilet Goods Assn., Scientific Meeting,
New York, N. Y. ..... Dec. 9

American Pharmaceutical Mfgrs. Assn., Mid-year and Eastern Section Meeting,
Waldorf-Astoria Hotel, New York, N. Y. ..... Dec. 9-11

26th Exposition of Chemical Industries,
Coliseum, New York ..... Dec. 16

Chemical Specialties Manufacturers Association, *Hollywood Beach Hotel,*
Hollywood, Fla. ..... Dec. 9-12, 1957

Packaging Machinery and Materials Exposition, *Atlantic City, N. J.* ..... March 25-28, 1958

Toilet Goods Association, *Poland Spring House, Poland, Me.* ..... June 25-29, 1958

College Awarded Study Grant

Dr. Ivor Griffith, president of the Philadelphia College of Pharmacy and Science, has announced the award of a grant by Aerosol Techniques, Inc. of Bridgeport, Connecticut. The grant was made to the Department of Pharmacy, which recently installed an aerosol laboratory for basic and applied research in this field.

In making the grant, H. R. Shepherd, president of the Bridgeport custom filling company, said it was made to make possible the investigation of basic physical and chemical relationships between propellants, medicinal agents, and vehicles — data much needed in the development of new pressurized pharmaceuticals.

The research program at the college will be under the immediate direction of Dr. Martin Barr, associate professor of pharmacy, with the collaboration of Dr. Linwood F. Tice, director of the Department of Pharmacy.

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DuPont Cuts Zytel Prices

Price reductions of about 10% on Zytel nylon resins were announced late last month by E. I. DuPont de Nemours & Co., Wilmington. The company said the new prices, effective Sept. 16, reflect savings through increased production of nylon molding powders and advanced technology. The resin is currently being used in the aerosol industry for the manufacture of molded containers.

The new price schedule calls for prices per pound for natural colored Zytel 101 of $1.35 in 22.5 to 99 pound orders, $1.25 for 100 to 1999 pounds, $1.23 for 2000 to 4999 pounds, 5000 pounds to minimum truck loads, $1.20.

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MRM Adds Labeling Line

The MRM Co., Inc., Brooklyn, N.Y., has announced the addition of labeling machines to its line of filling equipment. The announcement said that "quick acceptance by the industry of the company's automatic labeling machines" has necessitated the acquisition of additional manufacturing space at 55 Hope Street, Brooklyn.

The engineering and assembly departments of the labeling machine division have been transferred from the company's main Berry Street plant to the new building.

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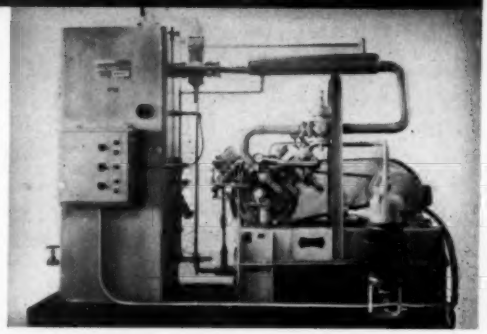
Toni Plans Heavy Ad Program

The Toni Co., Chicago, a division of the Gillette Co., has announced a heavy advertising campaign to promote its new "Adorn" invisible hair spray. The product is being advertised on eight network television shows, as well as with intensive spot program throughout the country. Being billed as the "self-styling" hair spray, the product is said to be the product of five years of Toni research.

In announcing the Toni ad plans, Stuart K. Hensley, executive vice-president, pointed out that "phenomenal as the growth of the hair spray market is, only one out of every three women uses a hair spray today and then only once a week."

MOJONNIER DEVELOPMENTS INCREASE YOUR AEROSOL FILLING PROFIT MARGIN



The keynote of all Mojonnier development is simplicity of operation. "Package" Refrigeration Units, available in capacities from 2 to 10 ton, are push-button operated making it possible for average help to control their operation.

EACH NEW AEROSOL FILLING LINE MACHINE DEVELOPED MEANS . . . LOWER OPERATING COSTS FOR MOJONNIER EQUIPMENT USERS

You reduce your operating costs when you can eliminate highly trained "specialists" from your payroll. When you use Mojonnier equipment, simple controls and adjustments and a minimum of moving parts mean lower maintenance costs and more efficient operation.

A typical example of advanced *Aerosol Engineering* is the combined pellet feeder and can coder shown at left. This compact unit automatically drops an agitator pellet in each container and moves it to the next station where it receives a code stamp on the bottom before moving onto the filling line proper.

The exclusive Mojonnier "add-a-unit" design permits newly developed machines to be inserted into existing lines with a minimum of production loss. With Mojonnier equipment, you can take advantage of all new developments and keep your line up to date instead of making costly conversions or "getting along" with less efficient equipment.

BEFORE YOU BUY CHECK MOJONNIER FOR THE LATEST AND BEST IN COMPLETE LINES FOR AEROSOL FILLING

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Canco Names Directors

American Can Co., New York, last month named to its board of directors two former directors of the Dixie Cup Co., recently acquired by Canco. The new directors are Cecil F. Dawson, former Dixie Cup chairman, and Craig Moore, formerly vice-president in charge of commercial products. They succeed Roy E. Tomilson and Arthur O. Choate, who resigned from the Canco board.

Propellant Systems

(*From Page* 45)

For the aerosol chemist, the physical properties of the propellants which are of practical interest are boiling point, vapor pressure, liquid vapor density, specific heat and solubility in various media. The physical properties are directly related to the degree of fluorination and chlorination. For example, looking at Propellants 11 and 12 in the chart, as fluorination increases from a single fluorine on 11 to two on 12, there is a resulting decrease in molecular weight. As the chlorines decrease from three on Propellant 11 to two on Propellant 12 to one on Propellant 22, the molecular weight decreases through the series 11, 12, and 22. Going over to the ethane series we see immediately that Propellants 113 and 114 are much higher in molecular weight. The boiling point drops to 95°F. from Propellant 11 to Propellant 12 due to the increase of one fluorine and the decrease of one chlorine. Hydrogen content also affects physical properties. The replacement of one chlorine by hydrogen on Propellant 22 drops the boiling point 20°F. The liquid density of the methane series shows against the effect of fluorine, where the density decreases quite rapidly from 11 to 12 to 22. In the ethane series, the carbon chain increase generally results in higher densities, higher molecular weights and higher boiling points.

The specific heats of the liquids are different; this difference is not highly significant except that Propellant 22 has the highest specific heat and Propellant 11 the lowest. Both the solubility of the propellants in water and the solubility of water in the propellants is in the order of parts per million. It is readily demonstrated that degree of fluorination also influences flammability. The five propellants under discussion are all sufficiently fluorinated to make them nonflammable.

We now see what the effect of fluorination and the structure of the propellant have on physical properties. That is, increasing fluorination decreases boiling point, solvency, molecular weight and density. We have also noted that increase of chlorination causes opposite effects on these properties. Hydrogen causes certain other changes. For example, Propellant 22, with a single hydrogen, two fluorines and one chlorine, has greater water solubility, higher vapor pressure, lower boiling point and somewhat less stability in alkaline water systems. The chart shows the vapor pressure in lbs. per square

(*Continued on Page* 72)

PHYSICAL PROPERTIES OF FLUORINATED-CHLORINATED HYDROCARBONS

		"Propellant 11"	"Propellant 12"	"Propellant 22"	"Propellant 113"	"Propellant 114"
Chemical Formula		CCl_3F	CCl_2F_2	$CHClF_2$	CCl_2F-$CClF_2$	$CClF_2$-$CClF_2$
Molecular Weight		137.38	120.92	86.48	187.39	170.93
Boiling Point at 1 atm.	°C.	23.77	−29.80	−40.80	47.57	3.55
	°F.	74.78	−21.64	−41.44	117.63	38.39
Density, Liquid at 30°C.	g./cc.	1.466	1.294	1.177	1.556	1.443
at 86°F.	lbs./cu. ft.	91.38	80.63	73.36	96.96	89.91
Specific Heat, Liquid (Heat Capacity) at 30°C.	cal./g./°C.	0.209	0.243	0.335	0.218	0.238
at 86°F.	B.T.U./lb./°F.					
Solubility of "Propellant" in Water at 1 atm., temp. in °C.	g./100g.		0.026^{27}	0.12^{30}		0.014^{20}
Solubility of Water in "Propellant"	%					
at 30 °C. (86°F.)	g./100g.	0.013	0.012	0.15	0.013	0.011
at 0°C. (32°F.)	g./100g.	0.0036	0.0026	0.060	0.0036	0.0026
Flammability		nonflammable	nonflammable	nonflammable	nonflammable	nonflammable
Toxicity		Group 5A	Group 6	Group 5A	much less than Group 4, somewhat more than Group 5	Group 6

Inaugurates Dryer Operation

Adolph Schwarz, president of the Polak & Schwarz world organization, took the occasion of his recent visit to New York to announce the beginning of operation of the firm's new "Niro Spray Dryer." The dryer is housed in a wing of the recently completed addition to the flavor manufacturing plant at Teterboro, N. J.

In a statement marking the beginning of the unit's operation, Mr. Schwarz stated he believed that the firm's many years of experience gained in Europe in the spray drying field, plus installation of the new equipment, will serve to put the firm in the forefront in the powdered flavor field.

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Krylon Names Southeast Rep.

The Milton M. Shamitz Co., Atlanta, has been appointed sales representative to the automotive trade for Krylon, Inc., Norristown, Pa., manufacturer of spray enamels and protective coatings. The company will represent Krylon in Alabama, Florida, Georgia, Mississippi, North and South Carolina, Tennessee, and Virginia.

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Rutgers Marketing Course

The Rutgers University College of Pharmacy, Newark, N. J., in cooperation with the Pharmaceutical Advertising Club of New York, will begin its third annual course on "The Development and Marketing of Drugs" beginning Sept. 18. The 16-week course, to be given on Wednesday evenings, will emphasize the successful methods used by leading pharmaceutical houses to solve their development and marketing problems.

John W. Nuffort, American Cyanamid Co., will be coordinator of the course, which will include leading executives of pharmaceutical firms as speakers.

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Hilbrant to C-P Marketing Dir.

The appointment of Robert E. Hilbrant to the position of director of marketing for the Toilet Articles Division of the Colgate-Palmolive Co. was announced last month from the company's headquarters in New York. As vice-president and director of marketing, he will have the responsibility of supervising and coordinating all the division's marketing activities, with the general product manager, the general sales manager, and the manager of market research reporting directly to him.

Mr. Hilbrant has been associated with the Colgate organization for 33 years.

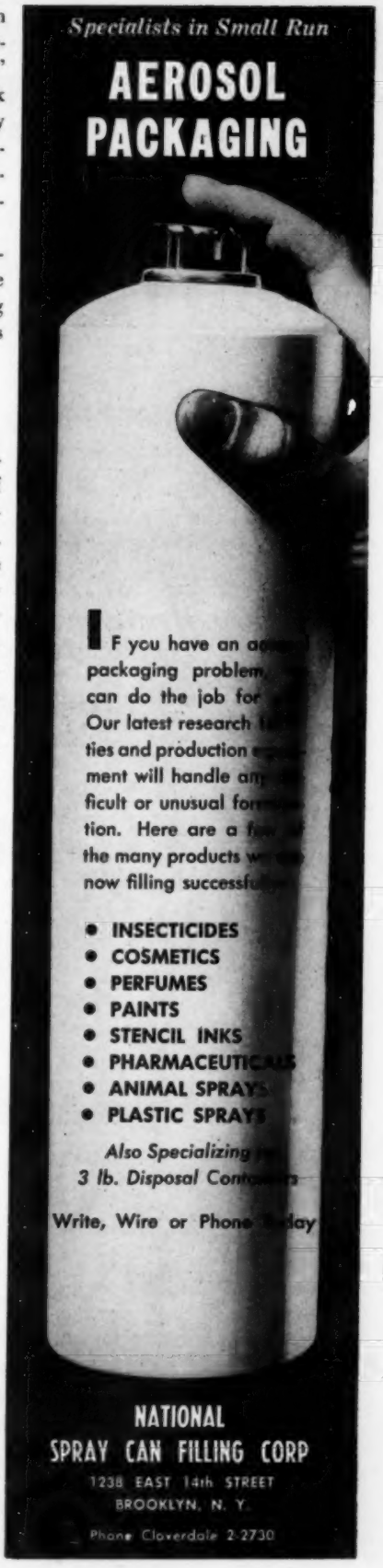
Plans Announced for 26th Chemical Industries Exp.

THE 26th Exposition of Chemical Industries, the largest display of its kind ever staged, will be held at the New York Coliseum Dec. 2-6 with more than 530 exhibitors listed by the end of July. Among the new sections added to last year's exposition list will be a Chemical and Chemical Materials Section and a Laboratory Materials and Supplies Section.

According to the first announcement by the exposition staff, this laboratory equipment will "reflect many developments of importance in research implementation and also in the application of laboratory techniques to the regulation of processing." Among the units of particular interest to the aerosol industry will be a triple-stage vapor flactometer, which will reportedly greatly expand the range of gas chromatography over that available in the laboratory with existing instruments.

In another exhibit the "Chomatographette," a newly-designed desk model for the simple and rapid analysis of gases and vaporizable mixtures, will be shown. Other units are an "Autoanalyzer" which measures ratios or levels of concentration of selected components in the production of antibiotics and others, a continuous automatic analysis unit for measuring silica concentrations and total water hardness, and a complete display of distillation equipment for laboratory and pilot plant operation.

Other "firsts" will include Teflon-lined steel pipe and fittings, and chemically inert jacketed fittings for flexible hose used in handling chemicals.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- Filling Machines (Cold and Pressure)
- Valves (Liquid and) Foam/Cans and Glass Bottles)
- Product Concentrates
- Laboratory Service
- Advice and Consultation

Valve Clincher
Metal Cans and
Bottles
DP-104 and DP-104a

All Products manufactured to our own Designs, Formulations and Patents. Valves available from Germany and Italy—Filling Machines from Germany—Laboratory Equipment and Concentrates from Switzerland.

Publishers of "European Aerosol Survey," a quarterly periodical

Catalogues and Prices on Request.

Who's Who in the Aerosol Industry

Victor DiGiacomo, administrator of the perfume laboratories of Givaudan-Delawanna, Inc., New York, has been associated with aerosols for many years, and as early as 1956 helped set up his company's first aerosol laboratory for the study of problems connected with the perfuming of pressure - packaged products. Even in those early years he recognized the importance of aerosols and the need for odors specifically designed to meet the requirements of aerosol dispensing. Working on this premise, he initiated a number of studies to develop perfume blends compatible with the various propellants, various types of containers, and other components of the pressurized package.

In his present position he is involved, not only with the perfuming of aerosols, but with the scenting of soaps, cosmetics, sanitary products, and a host of other materials.

Graduated from New Jersey State College in 1939 with a B.S. degree in chemistry, Mr. DiGiacomo later attended the Patterson College for advanced study in this subject. In 1940 he joined the Givaudan organization and worked in the company's laboratories continuously (except for a period of service with the Navy during World War II) until the present. In his capacity of perfumer-chemist, he helped set up the firm's industrial perfuming section and began the industry's initial research work on the application of aerosols to toilet goods and other products.

He is chairman of the Personal Products Subcommittee of the CSMA, and has done considerable work

toward expanding the use of the aerosol package. He has delivered several papers on the subject to the CSMA, and also before the Toilet Goods Association and the Society of Cosmetic Chemists. He is a charter member of the American Society of Perfumers and a member of the Society of Cosmetic Chemists.

Mr. DiGiacomo has contributed articles on aerosols and other subjects, to various trade papers and is a steady contributor to the house magazine of Givaudan-Delawanna, Inc., "The Givaudanian."

A. R. "Al" Marks, technical sales manager of the Aerosol Division of the Wheaton Plastics Co., Mays Landing, N. J., is a well-known advocate of plastic-coating for glass aerosol containers, and has delivered papers on the subject to the CSMA, the Society of Cosmetic Chemists, and other trade groups.

Born in Philadelphia and educated in the public schools there, Mr. Marks attended the Philadelphia School of Industrial Arts. He began his business career with the Freed Heater and Manufacturing Co., Collegeville, Pa., and later joined the Kimble Glass Co. When that company became the Kimble Division of Owens-Illinois in 1947, he joined the staff of Wheaton Glass as sales manager of the Electronics Division.

Mr. Marks has been extremely active in the CSMA, and is a member of two of the Aerosol Division's most important committees, Publicity and Publicity Steering, and Product Survey. He also represents his company at TGA, SCC, and other trade association meetings.

Mr. Marks is, by hobby, a magician, and up until a few years ago often occupied his spare time with night club and theater appearances in the Metropolitan Philadelphia and New Jersey areas.

He is extremely optimistic about the future of aerosols for a variety of product types, and predicts tremendous increases in "conversions to the aerosol method" (particularly in perfumes, pharmaceuticals, and cosmetics) during the coming years. He also sees increased diversification of container types occurring as the pool of technical knowledge about container materials continues to grow.

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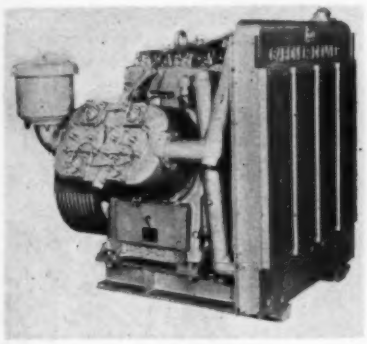
Products— Processes— Bulletins—

New Compressor Announced

Gardner-Denver Co., Quincy, Ill., recently announced the addition of a new, high-capacity unit to its established WB line of air compressors.



The new Model WBN, designed to save costly floor space, is a 200 hp., two-stage packaged unit occupying only 34 square feet of space. In many instances, the new compressor is reportedly sufficient to permit retirement of two smaller compressors, with corresponding saving in space.

The WBN needs no special base. All that is required to put it into operation is to bolt it down and hook it up to its source of power. Once installed, it is claimed to operate on long, steady runs, with little attention. It is available with a tube-type intercooler or with a self-contained radiator-intercooler to save on cooling water.

•

Island Automation Booklet

Island Equipment Corp., Long Island City, N. Y., last month announced that it is offering, as a public service, a folder entitled "Automation, Its Meaning and Implications." The booklet covers a speech before the Miami, Fla. chapter of the American Materials Handling Association by James C. Vadakin, Ph.D., professor of economics, University of Miami. Copies of the folder may be obtained by writing to the company at 27-10 Bridge Plaza North, Long Island City 1.

•

Guenther Issues Tour Report

Dr. Ernest Guenther, vice-president and technical director of Fritzsche Brothers, Inc., New York, in a special bulletin issued by his firm, last month reported on the essential oils situation in Africa. Dr. Guenther's reports were prepared while he was on his extensive tour of the essential oils producing regions of Africa. They are available to users of essential oils and related products by writing to the company at 76 Ninth Avenue, New York 11.

•

Aerosol Solvent Bulletin

Sole Chemical Corp., Chicago, recently issued a new technical bulletin describing its distilled Isopropyl Myristate, a non-greasy, oil soluble solvent and spreading vehicle for aerosol skin and hair preparations. Copies of the bulletin, number 757-1, are available by writing to the company at 27 E. Monroe St., Chicago 3.

Concan Aerosol Booklet

Continental Can Co., New York, has just completed a new informational brochure, "Aerosols", which reviews the history and growth of aerosols, surveys the market and product field, outlines Continental's facilities and services, and provides a listing of contract fillers, valve manufacturers, and other aerosol industry suppliers.

Copies of "Aerosols" can be had free by writing to Department A, Continental Can Co., 100 East 42nd Street, New York 17, New York.

•

New Aromatic Developed

"Lilial", described as "a major contribution in the field of synthetic aromatic chemicals," was announced last month by R. E. Horsey, vice-president in charge of sales of Givaudan-Delawanna, Inc., New York. Developed by the Givaudan research staff, the new chemical is a pure aldehyde with an odor recalling linden blossoms, and, according to Mr. Horsey's statement, "fills the need of a perfumer for a floral component having smoothness and intensity, plus unusual stability."

It is pointed out that "Lilial" has specific qualities not usually found in a basic aromatic chemical — floralcy, warmth, and naturalness, and is expected to find use in cosmetics and other products. Samples and technical data can be obtained by writing to the company at 330 West 42nd Street, New York 36.

Mojonnier Develops Two New Collets

Mojonnier Associates, Inc., Franklin Park, Ill., has announced the development of two new collets to add to its line of collets for coated and uncoated glass and nylon containers. The new collets are designed for attaching the Risdon J.B.R. powder valve and successfully crimps valves to both neck diameters of the Peerless Tube aluminum containers. According to Mojonnier Associates, the chief advantages of this method of attaching aerosol valves are high speed and no-work hardening of the valve skirts. The container at left in the photo is the "purse-size" Peerless container.

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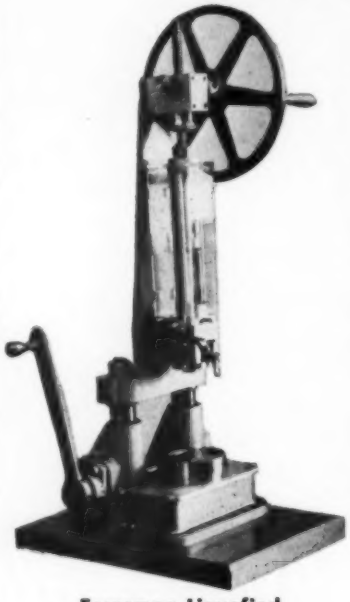

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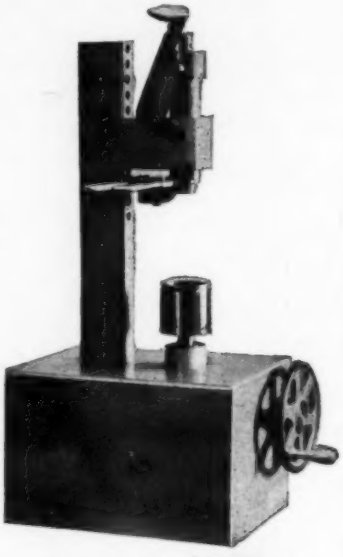
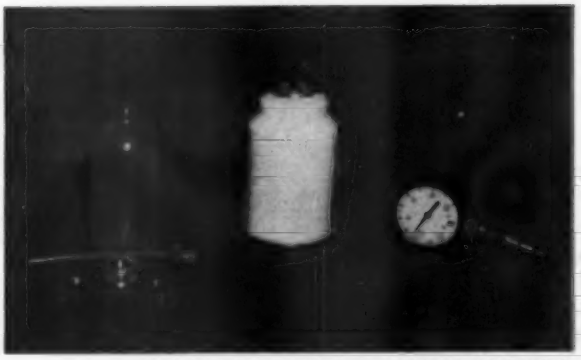


Foresman Hand Operated Vial Capper



Here's all you need for your pocket-sized lab. (Left) screw-on top, plastic-coated bottle (disassembled) with valve. Center—can of propellant complete with transfer valve. Right—hand pressure tester.

MAKE YOUR OWN AEROSOL SAMPLES

This quick, easy method allows you to make aerosol samples of your own or prospective customers' products in 5 simple steps . . . without investment in expensive equipment. (1) Pour your product into the dispenser can. (2) Fasten valve in place with screw retaining piece. (3) Fill with propellant. (4) Test for pressure. (5) Spray your finished aerosol—all in less than a minute!

PRICES: 6 sets, including 2-oz. plastic-coated bottles, screw-on tops and valves—**$23.50.** 6—12 - oz. cans of propellant with filling head (specify propellant required) **$21.00.** Hand pressure testers—**$8.50, $15,** and **$47.25.**

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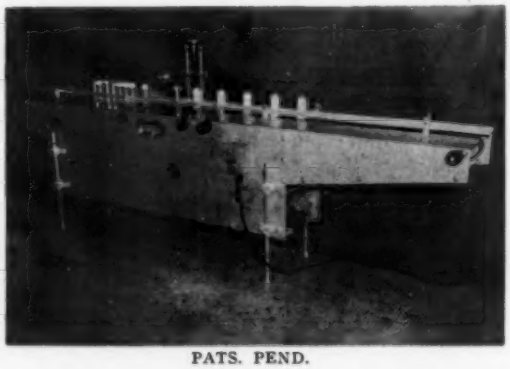

PATS. PEND.

Kiwi® Coders Corporation announces a new power-driven machine for economically and automatically code dating the concave bottoms of pressurized cans or flat bottoms of other round containers. Can also be used as a work table for affixing parts to cans.

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Solfrene Issues Booklet

A ten-page illustrated booklet describing products, valves, and filling machinery has been issued by Solfrene s.r.l., Milan, Italy, a leading aerosol company in that country. Each product is illustrated and the type and mixture of propellant used in each is described. The firm's valves are made under license from Ridson Mfg. Co., Naugatuck, Conn.

•

New Shellac Described

F. H. Paul & Stein Bros., Inc., New York, last month issued a report on their "S-40 Shellac," a special shellac made in Germany and currently being used by manufacturers of aerosol hair lacquers.

"Before the advent of aerosol packaging, hair lacquers were distributed largely in glass containers. A chlorine-bleached refined shellac was generally quite satisfactory for this purpose. However, due to the comparatively high acid number of such chlorine-bleached shellacs, and the presence of a certain amount of water, plus the chlorine, these shellacs were, in many cases, not satisfactory for aerosol packaging. The presence of traces of mineral acids, plus water, often caused corrosion of the container.

"Furthermore, chlorine-treated shellacs have a tendency to polymerize rather quickly, not only in their dry state, but also in solution. The difficulties often experienced when using these shellacs are usually caused by the nature of the bleaching process, which involves, first, the use of strong causticizing solutions and chlorine, and, finally, mineral acids for the precipitation of the shellac, plus a great deal of water. This process results in a high acid number of usually about 85, and sometimes above.

"S-40 Shellac," however, is not chlorine-treated, and is rather obtained by treating the raw lac material with specially selected solvents. The light color is obtained by de-colorizing with activated carbon.

"Because of this treatment (in reality a highly-developed physical refining process) this particular shellac is never dissolved in water (in fact, contains only a minute amount of chemically-bound H_2O), and has an acid number of only about 70-71. Due to the production method, this shellac also does not polymerize for a period of many years.

The company reports that S-40 has color, high gloss, and general film characteristics that compare very favorably with those of bleached shellacs, and that "there are currently underway a series of experiments employing combinations of it and certain synthetic resins."

Fritzsche Bros. Booklet

"Fritzsche Values," a 50-page booklet illustrating and describing the company's activities, has been published by Fritzsche Brothers, Inc., New York. Providing a visual "visit" to the firm's New York and Clifton plants, the booklet also serves as an introduction to the processing and testing methods employed in the production of perfumes and flavor materials. It is amply illustrated with photographs.

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Automatic filling line with unscrambler, Hope filler, Oil Equipment explosion-proof crimper and gasser and 20' hot water bath.

Propellant handling system with Aurora turbine pump, surge tank and safety controls.

Bulk alcohol system with 2000 gallon tank and pump.

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Admittedly this is an unusual offer. Applicants must be fully qualified and prepared to show financial responsibility and references.

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Propellant Systems

(*From Page* 64)

inch absolute vs temperature in °F. Here again we see the vapor pressure increasing as the degree of fluorination increases in any homologous series.

Since the individual propellants represent such a broad range of vapor pressures, densities, boiling points, and solubility characteristics among themselves, the combination of one or more propellants according to the effect desired, can be achieved almost at will. As a result of this broad spectrum of properties, aerosols of widely varied characteristics have been made, and there is ample room for new developments.

The physiological properties of the fluorinated hydrocarbons again shows the beneficial effect of fluorine substitution. In these propellants, toxicity is reduced to a safe level. The Underwriters Laboratory, Bulletins MH 2256 and MH 2375 and the U.S. Bureau of Mines Bulletins RI 3013 and RI 3185 have presented an exhaustive study of the toxicology of the halogenated hydrocarbons.

The following is quoted from the Bureau of Mines Report:

"Exposure for seven to eight hours to 20% (by volume) dichloro-difluoromethane (Propellant 12) produces mild to marked generalized tremor in monkeys. When they attempt to walk they act very much like persons suffering .from alcoholic ataxia. They react to light and stimulae and do not become unconscious. The maximum severity of symptoms is reached in the first 10 to 20 minutes of an exposure. The tolerance is developed with successive exposures as manifested by decrease in severity of the symptoms. Guinea pigs show no significant symptoms.

"No fatalities occurred among the dogs and monkeys. The fatalities among the guinea pigs used for symptoms and fatality observations, were two out of a group of 16 exposed to gas and one out of a group of 16 controls during the 12 week test, thus indicating no effect of exposure on fatality.

"Autopsies performed on all animals revealed no gross pathology attributable to the exposure to dichloro-difluoromethane (Propellant 12).

"By equalizing on constant volume, different weights of propellant 114 were likewise tested and the following may be quoted: 'Animals exposed to 20% by volume for a single exposure of eight hours; to 15% for single exposure of 8 to 16 hours; and to repeated exposures of 8 hours daily to 14.16% for 21 days (just terminated) revealed no gross pathological changes.'

"The results of the investigation show the toxicity of dichlorotetrafluoroethane, propellant 114, on a vapor volume basis is somewhat greater than dichloro-difluoromethane, propellant 12. On a weight basis it is of the same order as the latter and is an organic vapor of remarkedly low toxicity."

We have observed the chemical, physical and physiological properties of the five major propellants in use today. The growth of the industry which has been triggered by these propellants is still increasing, both in technology and consumer acceptance. We now foresee the next period of development to be in the pharmaceutical industry, where these propellants will, we believe, provide the safest and most versatile package the trade has yet encountered.★

Brickbats & Bouquets

(*From Page* 8)

this country. This product's container, valve, and propellant were manufactured locally, (though several of the active ingredient components were, of necessity, imported). The pressure and cold filling equipment was designed and constructed in our plant, at which we hinted in our article you published in your February issue. We said then that we would have to rely upon our own means to build up the aerosol industry here in its initial phase, at least until the local market proves sufficiently interesting to merit a large investment in costlier automatic filling equipment.

Antonio Arrigoni
FOTOQUIMICA S.R.L.
Buenos Aires, Argentina

To the Editor:

An early copy of *Aerosol Age* carried CSMA specifications and recommendations for available head space in aerosol cans. We would be grateful if you could advise us which copy this was. If it wasn't published in *Aerosol Age*, possibly you would be good enough to advise us where it might be obtained.

M. HAMBLETT
TRIMOL LABORATORIES LTD.
Auckland, New Zealand

We have advised Mr. Hamblett that the article in question appeared in our November '56 issue, and that further or more up-to-date information on the subject might be made available to him by writing direct to the Chemical Specialties Manufacturers Association, 50 E. 41st Street, New York 17.

The Aerosol Market

(*From Page* 43)

tion in his purchase and must be purchasing on some regular basis. The du Pont Company has conducted surveys to determine consumer opinion of aerosol products for a number of years. I should like to mention the results we have obtained from some of these surveys.

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The per cent of people (surveyed on a panel-type survey) who had purchased an aerosol product was almost 100% by 1955. Again in 1955 over 90% of all the people interviewed had purchased at least one of nine products during the past year, indicating very high current usage. We have found that there is relatively little difference in the purchase habits, whether a person is in the lowest or highest income group, and, that for quite a number of product types (both personal and household) the percent of purchase was essentially the same in urban and rural areas. There were strong indications that we have products which have very broad consumer appeal, and we have other data which indicates that there is relatively little difference in purchase habits by geographic area or by age group for most aerosol products.

We have continually tried to determine the degree of satisfaction shown by consumers of various aerosol products. One survey showed a very high degree of satisfaction with both household-type products and personal products. To me one of the most important findings we have made in our surveys is that, with a well-conceived aerosol product, the consumer shows very decided preference for the aerosol versus *any other type* of product.

Back five or six years ago some of our consumer surveys indicated that the consumer wished to buy products at retail outlets that did not normally stock these products. Most recent surveys on both drugstores, and grocery stores show that there is a very high incidence of stocking of aerosols of one type or another in all major retail outlets.

You will recall several paragraphs back I pointed out the growth which has taken place in aerosol colognes since 1953 to a point where approximately nine million units were produced in 1956. We have recently released some data obtained on consumer opinion of colognes and aerosol colognes. Of a total of approximately 1,825 women contacted through personal interviews, 75% used colognes of some sort. Only 27% of those women who used colognes

had ever even heard of aerosol colognes. Fortunately, 45% of these who had heard of aerosols had tried them. It was most significant that of those women who used aerosol colognes, approximately three-fourths of them preferred aerosols over all other packages. Some of the reasons given included: "easier to use," "practical," and "no waste."

I SUSPECT there is some correlation between this information we have obtained on the preference for aerosol versus non-aerosol colognes to future aerosol versus non-aerosol pharmaceuticals. As a matter of fact, we obtained data of this sort for three pharmaceutical type products. We surveyed 1,824 women through personal interviews, attempting to find information about their use and opinions of bandages, antiseptics, and burn preparations. 93% of all women interviewed said they use bandages in one form or another, 91% use antiseptics, and 73% use burn preparations. We chose to study these three products because they are all available already in aerosol form, and in our opinion as aerosols they have properties which should make them very attractive to the consumer. Since there have been only about eight million total pharmaceutical aerosols produced, we suspected that the knowledge and incidence of usage of these three products would be very low. Our findings revealed that, while the number of women who had used either a bandage or burn spray or antiseptic in aerosol form was very small, those who had showed a very decided preference for the aerosol.

So much for the past and the present. I hope you have a better understanding that in ten short years the production and subsequent sale of aerosol-dispensed products has grown to a very significant figure of approximately 325 million units in 1956. It is quite obvious that, at least with several very important products, significant advances in packaging have resulted so far as utility to the consumer is concerned.

What of the future? Those of us most closely associated with the so-

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called aerosol industry have come to use as a key in our thinking a phrase somewhat as follows. "If it (the product) must be suspended in the air or sprayed, dabbed, rubbed, brushed, squirted, or in any other way applied to the surface of any object—animate or inanimate — then perhaps it can be done better when dispensed the aerosol or push-button way." There are hundreds, even thousands of people in many fields of endeavor thinking and working in this direction, so that the production of aerosols has expanded at the rate of better than 30% per year for five years. A similar rate of expansion will not take place in 1957 over 1956 with some of the older aerosols. However, with the new developments which are already in the works, plus a little bit of blue-sky thinking, I have no hesitancy in predicting that the over-all growth of aerosol production will continue to be at a rate of at least 25% per year for several years to come.

So far as drug and pharmaceutical items are concerned, I feel that I am in a relatively poor position to do much prognosticating. However, I would say that if satisfactory products can be technically and medically proven, there will be less of a problem selling the consumer than anyone in the chain of sales from your production to the consumer. I don't mean that the products will sell themselves. The products must be well conceived; they must do a job; but you have got to tell the doctor, the patient, the consumer about them. Tell them and show them how good they are. Blow your horn about your products as you will hear us in the aerosol industry blow our horns about aerosols in general. The consumer has had 11 years' time and about 1½ billion aerosols to help precondition him for you. I think the consumer is ready for push-button pharmaceuticals. You probably have just the product he wants.★

Aerosol Valves

(*From Page* 39)

trable seal for attaching to another piece of apparatus.

As new containers are developed, the valve manufacturer can be expected to cooperate to supply valves of the proper dimensions and satisfactory construction. In the case of glass aerosol containers, for example, the glass manufacturer established a modified 20 millimeter serum bottle finish as standard. Completely non-metallic valves were developed to complement the non-metallic container. Twenty millimeter size valves have since found use on plastic, aluminum, and stainless steel containers.

General Considerations

After selecting a combination of valve and propellant to deliver the product in the desired form, tests must be carried out to check the compatibility of the valve components with the formulation. Metal valve parts may corrode and rubber and plastic parts may swell and crack, leading to inoperability of the valve, seepage of product, contamination of product, or excessive gas losses. Under some conditions corrosion may be low enough to present no problem from the standpoint of the expected life of the package. Swelling of the rubber parts is expected and taken into account by the valve manufacturer; however, some products may require valves with special seats and gaskets, if available. Often reformulation of the product with less active solvents will enable it to be used with standard valves. Virtually all pressurized packages lose weight on standing. When this is recognized at the outset, a realistic attitude can be taken with respect to the shelf life.

There is no general agreement on how long compatibility tests should be carried out. Clearly, the longer the better. At least one loader is reported to accept or reject a potential package on the basis of his own controlled 90-day test.

In addition to the standard requirements for valves, the pharmaceutical industry will unquestionably bring new ones to the valve manufacturer. Typically, the need for special actuators and applicators is being voiced. There are now available, or in the development stages, valves and actuators to facilitate the pressurized application of practically every type of product presently being administered with swabs, inhalers, insufflators, injection type applicators, squeeze bottles, or the old-fashioned spoon and drinking glass. Even so, the valve industry looks forward and asks for the opportunity to help you develop your new pressurized products.★

New Aerosol Patents

The data listed below is only a brief review of recent patents pertinent to the readers and subscribers of this publication.

Complete copies of these patents may be obtained by writing to the publisher of this magazine, Aerosol Publications, Box 31, Caldwell, N. J., and remitting 50c for each copy desired. For orders received outside of the United States the cost will be $1.00 per copy.

2,797,965. Aerosol Bomb. Patent issued July 2, 1957 to Edward J. McKernan, Crystal Lake, Ill., assignor to Seaquist Manufacturing Corp., Carey, Ill., a corporation of Delaware.

In an aerosol bomb having a container of fluid under superatmospheric pressure and having a valve stem operable by a user's finger to open and close said container with respect to the atmosphere; the combination of a cap on said stem having an outlet port connected to the container when the stem is in open position, said cap having a plurality of discharge ports of various sizes connected to said outlet port and spindles in respective discharge ports in slideable substantially fluid-tight engagement therein, each of said spindles having an outlet spray passage and being moveable to connect and disconnect said passage with respect to said outlet port.

2,799,435. Molded Nylon Container. Patent issued July 16, 1957 to Robert H. Abplanalp, Bronxville, N. Y., assignor, by direct and mesne assignments, of one-half to John J. Baessler, Yonkers, N. Y.

A nylon container body having a peripheral wall, and a plurality of beads extending in the direction and for the greater portion of the depth of said body and integral with said wall and spaced apart about the latter, the cross sectional area of those portions of the wall between the beads being of the order of 1½-3½ times the cross sectional area of the beads.

2,801,000. Holder For Cone Top Cans. Patent issued July 30, 1957 to Richard S. Wolowicz, Chicago, Ill., assignor to Container Corp. of America, Chicago, Ill., a corporation of Delaware.

A package comprising a row of cone top cans, each of which has a cap closure formed with a downwardly directed flange, and a holder therefor, said holder being formed of foldable paperboard and including top and bottom walls substantially equal in width to the diameter of said cans, two oppositely disposed side walls substantially equal in height to the height of said cans, said walls being hingedly interconnected to provide an open end tube encircling said row centrally thereof with the end cans of said row partially extending beyond said tube, means for retaining the lower portions of the end cans of said row within said tube, a retaining tab integrally and hinged joined to said top wall at each end thereof, an opening in each tab adjacent said top wall, said tabs being depressed and the interior edge portion of said opening remote from said top wall engaging a portion of the downwardly directed flange of the cap closures of said end cans, and the material, cut from said openings forming extensions of said top wall overlying the cap closures of said end cans.

2,796,296. Nozzle Exit Valve. Patent issued June 18, 1957 to John F. Campbell, Euclid, Ohio.

In a nozzle having an exit orifice and an axially reciprocable tappet valve member adapted to seat in such orifice, a primary conical portion on said member adapted to seat against the outer edge defining such orifice when the valve is closed and to determine the initial angle of the spray cone delivered by such nozzle when such valve is opened.

Trade Mark Applications

Applications for registration of the following trademarks were published in recent issues of the *Official Gazette* of the U. S. Patent Office. In not all cases are there strictly aerosol trademarks, however many of the products listed below come within the category of those for which a possible future use in aerosols is foreseen.

Spray Rite, in script with accentuated first letters, for anti-offset spray preparation in liquid and powder form for use in printing, lithographic, and flexographic work, to Certified Materials Co., Milwaukee. Filed June 19, 1956, with first use claimed Jan. 1, 1955.

Safeguard, in capitals, for non-flammable corrosion preventive applied to metal surfaces in the form of an aqueous emulsion by either spray or dip application. Filed Nov. 19, 1956 by Dearborn Chemical Co., Chicago., with first use claimed Oct. 24, 1956.

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LANEX, in capitals, for hair cream, a hair pressing cream and lotion, cream rinse, and hair setting spray. Issued to William S. Cannon d.b.a. Cannolene Co., Atlanta. Filed July 2, 1956 with first use July 1, 1948.

SPIX NO-LINT, in capitals, with "Spix" on angle above, for spray concentrate for dissipating static electricity in fabrics, plastics, and other materials. Filed Oct. 18, 1956 by Lloyd E. Jackson, d.b.a. Spix Products Co., Pittsburgh, claiming first use Aug. 27, 1956.

VETO, in capitals, for deodorants for personal use in cream, spray, aerosol, and solid forms. Filed Oct. 19, 1956 by Colgate-Palmolive Co., New York, with first use claimed in 1897.

GLOW, for hair coloring liquid and cream, hair grooming spray. Filed Nov. 1, 1956 by Sears, Roebuck, and Co., Chicago, with first use on or about July 15, 1950.

ARDEN FOR MEN, in capitals and script, over a rearing horse insignia, for shaving cream, talcum powder, after shave lotion, cologne, stick body deodorant, and spray body deodorant. Filed April 17, 1956 by Elizabeth Arden Sales Corp., d.b.a. Elizabeth Arden, New York, with first use reported March 19, 1956.

FROSTY, in large capitals, for composition for decorative purposes in the nature of artificial snow flakes packaged in aerosol containers and applied by spraying. Filed July 27, 1954 by U. S. Packaging Corp., Bridgeport, with first use September 1951.

SPRAYWAY, in capitals, for aerosol spray preparation for prevention of mildew, mold, and musty odors. Filed Jan. 22, 1957 by Sprayway, Inc., Chicago, first use claimed November 1956.

PALMOLIVE RAPID-SHAVE, with last two words at angle, for aerosol shave cream. Filed Jan. 25, 1957 by Colgate-Palmolive Co., New York, with first use Jan. 21, 1952. First use claimed of "Palmolive" Jan. 1, 1900; of "Rapid-Shave", Feb. 10, 1909.

LEADING LADY, in white script on a black block background for hair spray and a complete line of toiletries and cosmetics, to Fuller Brush Co., Hartford, Conn. First use on or about Aug. 27, 1956, with trademark filing Oct. 11, 1956.

D and D, with "d's" in capitals, "and" in script, with swirl of "d" circling all three words, for pressurized or aerosol containers for household and industrial use filled with insecticides, insect repellants, room deodorants, weed killers, plant sprays, disinfectants, fire extinguishing compositions, lighter fluids, waterproofing compounds, a plastic compound containing oil of cedar for lining closets and chests, and compositions for producing material having the appearance of snow on Christmas Trees and other objects. Filed June 20, 1955 by Demert & Dougherty, Inc., Chicago, with first use in 1948.

DUCAIR, in capitals, for room deodorizer for spray dissemination, to Alex Eventoff, d.b.a. Ducair Products Co., New York. Filed Jan. 28, 1957, first use Dec. 10, 1956.

FOOTLIGHT, in large capitals, for cosmetic skin lotion. Filed Nov. 26, 1956 by Max Factor Co., d.b.a. Max Factor, Hollywood, Calif. with first use claimed Oct. 17, 1956.

METAL SHEELD, for aerosol anti-tarnish spray, to Glenwood Products Corp., West Englewood, N. J. Filed Jan. 8, 1957, first use Sept. 27, 1956.

ALL-SET, in solid capitals, for hair setting spray. Filed Feb. 17, 1956 by De Mert & Dougherty, Inc., Chicago, with first use on or about Jan. 26, 1956.

DOUBLE O, in solid capitals, for room air deodorant compound. Filed Dec. 11, 1956 by Tabtrol Co., Baltimore, with first use claimed Nov. 30, 1956.

PLIX, in solid capitals, for hair wave setting lotion. Filed Dec. 6, 1956 by Societe Monsavon-l'Oreal, Paris, France. Filed Dec. 6, 1956, first use claimed Oct. 10, 1956.

AIR-DISK, in red capitals with underlining "R", for air deodorizer. Filed Aug. 13, 1956 by Foster Brothers Co., Decatur, Ill. with first use claimed Jan. 2, 1949.

ODORETTE, in solid lower case letters, for room and closet deodorizer. Filed Jan. 11, 1957 by Klasco Products Co., Downey, Calif., which claims first use Dec. 10, 1956.

DELPHENE, in solid black capitals, for insect repellent, to Hercules Powder Co., Wilmington, Del. Trademark filed Jan. 22, 1957 after first use Sept. 18, 1956.

The Braznell Story

(*Continued from Page* 61)

In order to encourage early sales of the product for each one of these distributors, Braznell furnishes samples by direct mail to the distributors' customers, thus setting up a chain reaction much like the one that first launched the product. Also, the distributor is supplied with advertising and promotional literature to enable him to merchandise the product more effectively.

This merchandising approach has been tried with other products in the industry, but seldom with such surefire and quick success.★

•

Cyanamid Drops Purchase Plan

American Cyanamid Co., New York, has announced an abandonment of its plans to merge with the Norwich Pharmacal Co. because of "insurmountable legal problems." Both firms have aerosol product lines, American Cyanamid under the name of its division, Lederle Laboratories, and Norwich under its own label. Cyanamid also markets veterinary products through its Farm and Home Division.

According to initial announcements regarding the merger, Norwich was to have become a wholly-owned subsidiary of American Cyanamid.

•

Crown Contest Ending

The Can Division, of Crown Cork & Seal Co., Inc., Philadelphia, has announced that the billionth Crown Spra-tainer Can will come off the production line during the latter part of 1957. In celebration of this event, Harvey C. Tull, manager of aerosol products, has announced a contest which will award a large-screen television set to the contestant who comes closest to naming the day and hour when the billionth Spra-tainer comes off Crown's production line.

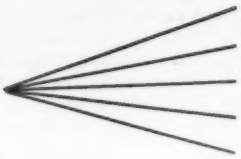
According to on present rate of production, the billionth Spra-tainer Can will be produced no earlier than September 3, 1957 and not later than November 29, 1957. Contestants should bear in mind, Mr. Tull points out, that Crown's Spra-tainer lines run Monday through Friday, 8:00 A.M. to 5:00 P.M.

The contest is open to everyone except Crown employes and employes of their advertising agency. All entries must be postmarked not later than August 31, and all who wish to enter need only write Harvey Tull, Crown Cork & Seal Co., Inc., Can Division, 9300 Ashton Road, Philadelphia 36, Pa. for an entry blank.

Dana Lists 2 Staff Changes

Dana Perfumes Corp., Chicago, last month announced the appointment of Richard Q. Livingston as vice-president and director of marketing. Mr. Livingston was associated with Dorothy Gray, Ltd., for 16 years, most recently as national sales manager.

At the same time the company announced that Arthur Kreinik, executive vice-president of Les Parfums de Dana, Inc., New York, had been appointed executive vice-president of the Chicago firm.



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Rates for classified advertisements are ten cents per word, $2.00 minimum, except those of individuals seeking employment which *Aerosol Age* will run without charge. Check must acompany all classified advertisements. Address all replies to Classified Advertisements with Box Number, care of *Aerosol Age*, Box 31, Caldwell, N. J. Closing date: tenth of month preceding month of issue.

Muscat Challenges Price Rise of Aluminum

ON THE heels of a recent price rise in aluminum, a leading executive in the aluminum container field last month challenged the Aluminum Co. of America on its claims of necessity for elevating the price of primary aluminum and fabricated items. Victor Muscat, president of Victor Metal Products Corp., in questioning the price boosts, made special reference to collapsible metal tubes, on which he says Alcoa cannot raise prices because the aluminum supplier represents a "minor factor" in the field.

Mr. Muscat also expressed dissatisfaction with some of the statistical evidence used by aluminum industry spokesmen to support the end-of-July price boost, which already has been followed by Reynolds Metal Co. and Kaiser Aluminum & Chemicals Corp. He declared that this represents the third price hike, for a total rise of 3½¢ a pound, in less than a year-and-a-half.

"The 'aluminum entente' points to sharp increases in costs since 1939, and claims this has been countered by only a 25% increase in the price of aluminum. The more realistic comparisons," Muscat contends, "are with 1948, at which time the metal was selling at 15¢ a pound. In this span of just nine years the price of aluminum has advanced by about 75%, and this is on the basis of costs rising since only 1948 and not 1939.

"In addition, the industry fails to mention that production of aluminum since 1939 has soared from a little over 400,000,000 pounds to well above 3,000,000,000 pounds last year; an increase of 650%. Moreover, special tax benefits and purchase agreements with the Government have enabled the aluminum companies to divert any excess production to the defense stockpile at market prices, the bill for which is borne by the American taxpayer.

"The aluminum industry granted annual wage boosts to 'buy' time from labor to assure continuity of operations for expansion and diversification. But this," explains Muscat, "was a one way deal for these companies. They just tacked the added costs onto their prices and the consumer is paying the bill."

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Aerosols in Review

(*From Page* 48)

board of Kenya's main agents, the Kenya Farmers' Association (Cooperative) Ltd., Nakuru; and more than seven years ago to the Societe Cooperative des Produits Agricoles (SOCOPA), Goma, Belgian Congo. In 1946 Mitchell Cotts and Stafford Allen and Sons, Ltd., together formed the East African Extract Corp. Ltd., having purchased the pyrethrum extraction plant from the Government of Kenya. Kenya pyrethrum growers were at this time offered an interest in the new corporation, but preferred to restrict them-

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2. **Room Deodorants**
3. **Paints, Enamels, Other Protective Coatings and Paint Remover**
4. **Other Household Products — polishes, glass cleaner, rug shampoo, water repellents, etc.**
5. **Shave products**
6. **Hair preparations**
7. **Other Personal Products — shampoos, body deodorants, sun tan oil, drugs, etc.**
8. **Medicinal and Pharmaceutical Products**
9. **Industrial Products — lubricants, stencil inks, belt dressings, etc.**
10. **Glass and Plastic Aerosols — all products**

Entries close October 15th. All entries should be forwarded to the committee as soon after September 15th as possible. To be eligible for entry a product must be on the market and have been freely offered for sale prior to September 1, 1957. Only one entry may be made by any marketer or brand owner in any one class.

Entry forms available from
The Aerosol Awards Committee of

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